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DP Budget-Cutting Measures Grow Popular

By E. Drake Lundell Jr. and Molly Upton
of the CW Staff

NEWTON, Mass. Major computer users will continue or expand their cost-cutting measures learned during tight budgetary times even when the purse strings begin to loosen.

This is a major conclusion of a recent *Computerworld* random survey of DP budgets of firms listed among the top 100 computer users in the country.

Contrast to 1971

Of those surveyed, 75% reported that their budgets would either remain the same this year or increase, in sharp contrast to the past two years when surveys of

the same group showed decreasing DP expenditures by major corporations.

Fully 40% of those surveyed will have budget increases, even though most of the increases will be relatively modest, generally less than 15%. 35% will have the same budgets as last year and 25% face budget reductions.

'More Bang'

But even with the increases, users were not prepared to stop cost-cutting measures—third-party leasing, independent peripherals, extended core—that they had used to get "more bang for the buck" during the tight economic times.

In fact, most of the major users surveyed were so satisfied with such cost-cutting moves that they planned to expand them use of such devices.

Of the firms, 20% said they felt their centers had received better budgets than other departments because management "is looking to DP to provide ways of alleviating manpower problems in other departments. They realize that by investing money in DP, they can save money."

It is surprising how well the firms have been able to function with the reduced budgets of the past two years.

(Continued on Page 3)

Proposed Software Tax May Set Precedent

By Edward J. Bried

of the CW Staff
SACRAMENTO, Calif. More taxes could be in store for all computer users, if state and property taxes proposed here are approved.

The state Board of Equalization is considering new taxes on software and services which, if they become law, will provide a "model for the nation," sources have predicted.

The board proposed "the tax-

ing of software as tangible property," and hearings are being conducted here to establish firm guidelines, an official said. A final decision has been postponed, pending analysis of the testimony of local firms.

In nearby Palo Alto attorney Kent Mitchell said this could be the first legislation of its kind in the nation. He also said it "may become a national model in whole or in part."

According to the Board of Equalization, "when a program is ready for implementation to perform the functions for which it was designed, the result is software, a tangible property within the meaning of the revenue and taxation code."

A separate sales tax proposal differentiates between prewritten ("canned") and custom programs. Sales tax would be paid on a canned program, but no tax

would be charged on a custom program unless it were transferred to the user in machine-readable form.

However, Mitchell explained, if a software house or consultant charged a user \$25,000 for a custom program, then gave him the product on a magnetic tape, tax would be paid on the full \$25,000. If the consultant gave him a listing, coding sheet, or other format which required user preparation before loading into the computer, then the programming "service" would not be taxable.

Sales taxes would also be due (Continued on Page 4)

NCR, CDC Users More Confident

By a CW Staff Writer

NEWTON, Mass. "After the RCA fiasco, the NCR-Control Data deal can only improve their positions, not detract from them."

That, in the words of one NCR user, pretty well sums up the reaction of the NCR-CDC user community to the joint agreement for peripheral and future central processor development announced recently by NCR and Control Data Corp. (CW, Feb. 2).

Beneficial Deal

Approximately 90% of the NCR users surveyed by *Computerworld* after the announcement felt the deal would be beneficial to users, particularly customers of NCR.

They also generally felt the move would help hold down deflections from both NCR and

CDC that might have been coming as a result of the RCA defection from the business.

'Pretty Shaky'

"Our top management was pretty shaky and wondered who would be the next to drop out of the business after RCA," one DP manager said.

"After this announcement, however, they are a lot happier about our choice of NCR and its commitment to the computer field," he added.

"We had some second thoughts around here after the RCA move," another said, "but this move will definitely make us breathe easier."

While NCR users generally had opinions about the proposed

deal, the CDC user, in general, felt that the move would have little or no effect on his installations.

"I didn't even think about it," one said, "because I can't see it making any difference to us. I

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Univac Reassures RCA Users

By Frank Flaska

of the CW Staff

ATLANTA—Univac will fill outstanding orders for RCA equipment and all new orders received by June 30, 1972. And existing RCA sites will not be forgotten—maintenance will be handled by CEs who have moved over to Univac from RCA, or by Univac personnel now being

trained.

These were the major points made by Univac management last night, meeting of the RCA Computer Users Association, held here last week.

RCA hardware wasn't Univac's only concern.

Users were impressed with Frank Delaney, director of sys-

tem programming for the Series 70 effort, who announced a firm schedule for future operating system releases.

TDOS—version 21... May 15; DOS 14... April 15; VMOS 8... Feb. 1.

Enhancement to the DOS RMS (Resource Management System) was announced with a June date.

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The consoles of the two 360/195s dominate the computer room, which also has three 360/55s.

On the Inside

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MIAMI Eastern Airlines last week dedicated its new \$31 million Dorland Computer Center here, home of its new twin 360/195s (CW, Aug. 4).

"If you have any aspirations to leadership in the airline industry," said Floyd D. Hall, Eastern

195s Will Boost Airline's Power

board chairman, "in my opinion, you must also become a leader in computer sciences."

"The IBM company," said Frank T. Cary, IBM president, "prospects and grows only to the

extent that it has customers who are willing and capable of using computers in new and exciting and creative ways. Eastern Airlines is a leading customer in every respect."

The 195s, which will go on-line next fall after a year of preparation, will increase the capabilities of the System One reservation system threefold over the 360/55s now used, said Frank M. Heinemann, Eastern vice-president, computer sciences.

Meet the mind expander. Monolithic Main Memory from ITEL.

Now there's an easy, economical way to expand IBM System/360 or 370 memory: add on Monolithic Main Memory from ITEL. (The Monolithic Main Memory is manufactured to ITEL specifications by Advanced Memory Systems of Sunnyvale, California.)

This monolithic memory lets you upgrade core at a lower price than core. It's far more reliable than core. And you can maximize capacity. For example, you can expand the 360/30 to 128K, the 360/40 to 512K, the 360/50 to 1024K and the 360/65 to

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The secret of ITEL's superiority over IBM core is found in its basic monolithic memory module. This semiconductor chip contains 1024 bits of storage. These memory elements are fabricated in batches of thousands, which cuts costs dramatically. And most wired interconnections are eliminated, so there are far fewer potential sources of failure. But even monolithic memory elements can sometimes fail. That's why ITEL has ECC: Error Checking and Correction. Should a memory

element fail, ECC corrects the error instantly. There is no effect on computer operations or processing. The operator is notified by an error light and maintenance can be performed without interrupting the memory's operation.

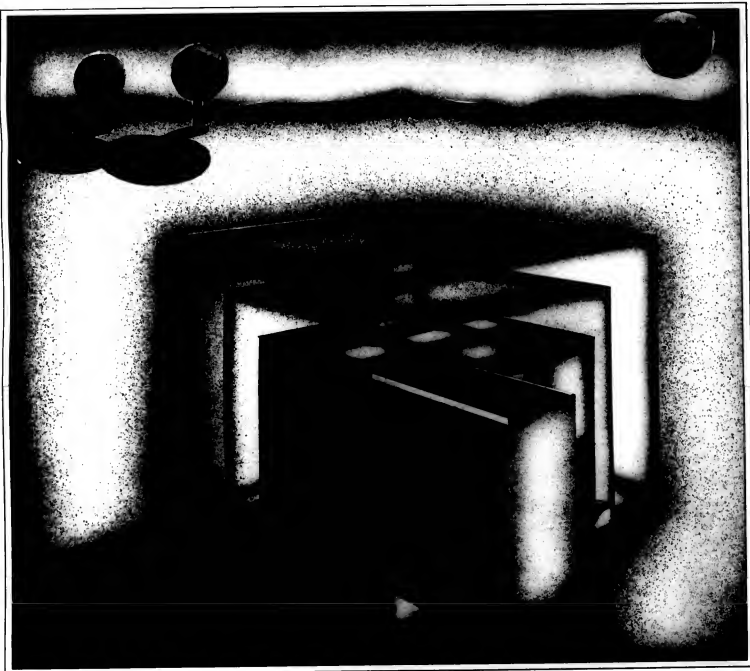
The Monolithic Main Memory from ITEL means savings in cost. Savings in speed. Savings in maintenance. And, in some cases, savings in floor space. It's completely compatible with IBM System/360 and 370. Handles all memory size changes. And it can be leased as

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ITEL is out to improve the system. With technical advancements. Complete corporate sales support. National field service. Around-the-clock maintenance. And with the people and financing policies that can create a customized solution to your particular problems. So meet all the ITEL mind expanders at your nearest ITEL office.



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Users More Confident After NCR-CDC Joint Venture

(Continued from Page 1)

guess it might make the firm stronger, but we've had no complaints about their equipment in the past."

Another felt that the move might be beneficial if it lowers the price of terminals offered by CDC, but beyond that

Cost Cutting Grows Popular

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"Even though we have been cut back for two years in a row," one user said, "we have still been able to handle the workload, and it has even increased a little."

Another had a particular problem: "We were able to perform so well with a budget reduction last year," he said, "that we have had our budget reduced again - and are expected to do the same. We will probably be able to do it with a little more belt tightening."

The tight budgets of the past few years, however, have prevented much new applications work, several of the respondents indicated.

Of the firms, 50% have already turned to third-party leasing to hold the lid on costs, and another 20% are definitely looking towards the third-party lessors.

In the area of independent peripherals, fully 60% of the firms already are using non-mainframe manufactured peripherals, and several are looking to them as a way to cut costs.

This 60% figure is way above the industry average, with most observers indicating only 10% of the peripherals installed come from independent vendors.

It appears that the larger, generally more sophisticated users were the first and still most enthusiastic users of such devices.

While only 10% of the users surveyed are already using core extension devices from independents, fully 40% more are seriously considering turning to extended memory to make their installations more efficient.

While most users have been able to find ways to cut their hardware costs through third parties or independent peripheral makers, they have had a much harder time reducing the costs of software.

Generally the users surveyed said they used a mix of in-house, packaged and contract software, with by far the greater reliance placed on in-house developed systems.

Because their budgets have been tight in the past few years, with widespread personnel cuts, users have been forced to put off planned projects.

At the same time users did not seem to be able to stretch their software dollars significantly by turning to packaged software or contract software for special projects.

In several cases, users reported they were able to save money by replacing several third-generation systems with machines from the "interim" generation, which started reaching users last year.

A trend toward greater reliance on centralized systems seemed to be evident in the survey.

Centralized Systems

Several of the major users said they had been moving toward centralized systems during the budget squeeze, placing a greater reliance on communications links with their outlying facilities rather than regional or local computer centers.

Several users also said the costs of communications links were hard to justify to corporate management and said that even in cases where they "knew" the company would save money by changing to such systems they could not justify them to the budget departments.

saw little effect from the move.

Most of the NCR users surveyed (65%) did not expect the move to have any effect on their present installations, almost to a man indicating their present configurations offered them enough processor power for the near future at least. Several of those who said the move would affect their installations saw the greatest effect in the peripheral equipment area.

"The move will probably allow us to upgrade our peripherals, especially in the area of tape and disk drives - at least I hope it does," one said.

About 60% of those surveyed reported they had experienced some problems with head crashes on the NCR disk drives and most of those felt the takeover of the disk operation by CDC could "only be a move in the right direction," as one said.

"While the disk problem was worse a year or so ago," one said, "the units are still very susceptible to environmental

changes. Almost anything seems to make the heads crash."

"At the same time though, the problem isn't as critical as it was before because NCR has gotten a lot better at repairing the units after a crash," he added.

CPU's Good

While the NCR users expressed some criticism for the peripheral equipment (high-speed printers and punched card equipment as well as disks in some cases) over 80% of those surveyed rated the central processor as good.

While most of those surveyed did not feel the move would affect their present installations, about 40% said the move might shade their future plans.

"When we decide to upgrade to a very large machine in three or four years," one user said, "compatibility will be a large factor."

"We might have considered going to IBM if NCR didn't have any large com-

patible machines, but we probably won't under the new arrangement," he added.

"The move will be a plus for NCR when we decide to upgrade," since they will now be able to offer us a completely compatible line," another user reported.

"While compatibility will be an important factor in our plans to upgrade, it won't be the only factor," another warned.

"We'll have to wait and see what the compatible line they are planning looks like before we decide," he added.

Most of the NCR users (around 65%) thought the move would enable the firm to beef up some areas of research and commit more funds to support of present users.

"I definitely hope that the move will allow them to commit more money to software support," one said. "Their software is good now, but it doesn't have all of the features that we would like to see."

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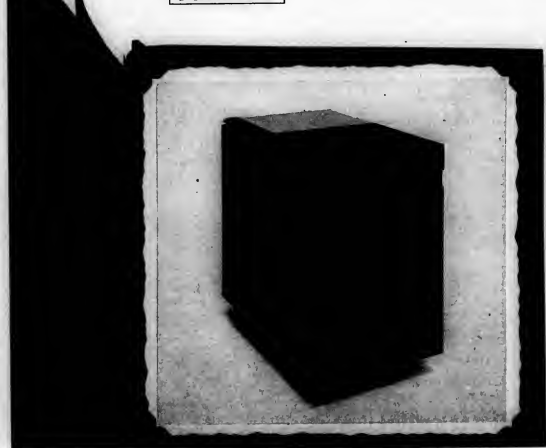
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AMPEX



Calif. Debates Software Tax Proposal

(Continued from Page 1)

"on charges for converting customer furnished information to machine-readable form," Mitchell added.

Taxing Services

Regarding rental of time from service bureaus, the proposed regulation does not tax straight rental of time, whether in batch or time-sharing modes, even if

customers furnish the processor with programs and machine-readable data.

"The processing must be done 'under the direction and control of service bureau personnel,'" This raises a "serious factual question," Mitchell stated, "for those customers who send their own personnel over to operate the computer when their data is being run."

The hearings have been going on for about a month, with software houses and service bureaus objecting to the proposals.

Jerome L. Dreyer, executive director of the Association of Data Processing Service Organizations (Adapro), agreed the proposed Property Tax Rule 32 has national implications. Sales Tax Regulation 1502, the other proposal being considered.

Dreyer also agreed with attorney Mitchell that the proposals were "ambiguous," and he said administering the property tax rule would be difficult because of problems in estimating the length of time software would be valuable.

A spokesman for the board noted the chief arguments included "serious doubt whether computer software is an appropriate subject of property taxation," as well as the negative effect on new businesses.

Some software is now being taxed as tangible property, the

spokesman noted, and the Board of Equalization is charged by law to issue rules and regulations "to achieve uniformity of assessment practices in all counties."

One of the principle areas of discussion, presuming property taxes on software are approved, is the "valuation" of the software, Mitchell explained. One method would be the "comparative sales approach," which would be "extremely difficult," Mitchell said, because of "the great variations between selling prices of the same kinds of packages."

While there is little legal precedent regarding software taxation, at least one recent case resulted in an out-of-court settlement which exempted both applications and system software and services from property taxation.

Eastern Airlines (EAL) won a tax reduction last year, based on its contention that software, services and training were intangible, and therefore did not come under Florida's property tax law (CJW, 2/28/71).

In that case, EAL was trying to prove the software was worth about half the catalog price of its system, which was acquired before unbundling. Under the California proposals, the entire system would be taxed. Mitchell said, if sold "bundled," and the software would still be taxed at full value if sold separately.

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Univac Echelon Reassures Users

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scheduled.
 IPS 70 type I support under development. The new OS/70, on the other hand, will not be developed.

Users were also presented with a list of proposed enhancements to existing software and were asked to assign priority.

Univac "decommissioned" its support to design of the 8580 disk system, 8460 tape, and the video operator console.

Replacements, Univac indicated would be either converted from the Univac product line or supplied by independents.

Univac reemphasized it wants to keep the customer base intact. The first goal of the organi-

zation headed by John C. Butler, vice-president and general manager of Series 70 operations, will be the development of a "bridge product" to ease transition from RCA to Univac equipment. The company hopes to have converted 80% of the users in the next 10 years, Butler said.

Outstanding and new orders for RCA equipment received before the end of time will be filled from RCA's large inventory, Butler explained.

This pledge to fill orders is limited, however, to those mainframes and other pieces of hardware which RCA had been able to develop and deliver prior to the collapse of its computer division, Butler told the group.

News Wrapup

Reject SS Data Bank Plan: Ervin

WASHINGTON, D.C. — U.S. Sen. Sam J. Ervin Jr. (D-N.C.), chairman of the Constitution Rights Subcommittee, has called for rejection of a plan to use the Social Security number as the nation's computers as a standard identifier of individuals. At the same time he condemned the "neutral position" of the Nixon Administration on the plan as "the natural tendency of the Federal Executive Branch to suffer gladly any accretion of its power over the individual."

Ervin told the members (in a letter) of the Information Processing Committee of the American National Standards Institute that he was pending decision on a proposed technical standard to use the Social Security number to track individuals in computerized records is not a mere technical decision but "a major philosophical decision affecting the rights of the individual, and the future uses of economic, political and governmental power in the computer age."

Justice Could Enter Interconnection Issue

WASHINGTON, D.C. — AT&T's continuing requirements for interconnecting devices may constitute restraint of trade and could result in Justice Department antitrust intervention.

While no definite action has been announced, it is known that the Justice Department is monitoring the interconnection closely and "continues to be concerned," according to an informed source. And although no formal complaints have been filed with the Justice Department, the antitrust division could enter the picture if it decides it is in the public interest.

One factor that might bring government action would be communications from users and others being affected by the DAAs.

Comma Holds IBM Maintenance Price Line

NEW YORK — Users of independent maintenance service got an extra break over the IBM maintenance prices last week.

Comma Corp. announced it would not raise its 1972 maintenance prices on IBM equipment to customers currently on contract or to customers who sign up before April 1, even though IBM recently was granted an 8% maintenance price increase by the Price Commission.

Prior to the price hike at IBM, Comma offered maintenance services at between 10% to 30% off quoted IBM price. With the decision to hold the maintenance price line, the firm now claims its prices to be from 18% to 38% off the quoted IBM price.

Tax Law Delays Paychecks for Workers

SAN FRANCISCO — San Benito County employees found themselves temporarily without their paychecks when the state payroll withholding tax law went into effect recently.

The county's 175 employees were due to receive their regular paychecks, but when the checks were delivered by the Bank of America from its payroll service department, it was discovered that the new income tax deductions had not been carried over in time from the 1971 files.

According to the payroll service department, the San Benito County payroll was the only one with which the bank had problems.

Latest Addition to Ski Patrol Real Novice

PORTLAND, Ore. — The latest member of the Mt. Hood Ski Patrol has never even been on skis.

The new patrolman is an IBM 1130, the core of a system designed to improve the efficiency and safety of the volunteer patrol organization.

The computer lets the patrol analyze accident trends, assign men to the five ski areas, project equipment and training needs, and keep track of the 600 patrolmen and their qualifications.

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Guide on Sequencing for Interchangeable Files by Ansi X3/Sparc

The "Revised Guideline Paper on Sequencing Rules for Interchangeable Data Files" was written to promote a better understanding of some of today's standardization problems. It was prepared by *Ansi X3/Sparc Study Group on Transition to Information Interchange Standards*.

It is desirable to assure that the sequence of items in interchangeable data files and the results of comparison operations in computers are independent of:

- Kinds of storage/transmission media.
- Kinds of code forms.
- Kinds of record formats.
- Kinds of storage organizations.
- Machine-readable labels.
- Data definition languages.
- High-level languages/compilers.
- System architecture.

Adherence to the following guidelines will permit users to construct files which can be processed consistently with respect to collating operations on a variety of systems. This will greatly facilitate the transition to and the usage of Ascii in interchange.

In existing applications the keys have already been designed, the data may exist, programs may be committed to a sequence, and therefore it is too late for guidelines on how to avoid problems.

It must be determined on an individual application basis whether these guidelines can be followed. An application may permit a key conforming to these constraints. An application may require a key which cannot conform to these constraints, but may impose no special requirement for the sequence, only that it be predictable, consistent, and reproducible in each of the interchanging systems; a separate sort key conforming to these constraints can be appended to each item, while the application-oriented key can be retained for display purposes.

If the application permits no choice in either key or sequence, then these guidelines cannot facilitate interchange among systems of different architecture.

Restrictions

To assure that sort keys will produce the same sequences, and that comparison operations will produce the same results, it is necessary to impose certain restrictions on the nature of bit patterns used in sort keys and in comparison operations.

These restrictions are derived from prior work on the properties of interchangeable data files and are not as severe as might appear at first. The rules for equality comparisons, as used in searching, are even less restrictive.

Guidelines for selecting bit patterns suitable for sort keys and for comparison operations involving the relative high-low magnitudes of data which affect branching in programs, may be summarized:

- Use either numerics (10 decimal digits) or upper case alphabetic characters (26 upper case Latin letters and Space) or lower case alphabetic characters (26 lower case Latin letters and Space) from coded character sets which sequence decimal digits in ascending order from 0, 1, ..., 9, upper case letters in ascending order from Space, A, B, ..., Z, and/or lower letters in ascending order from Space, a, b, ..., z (e.g., Ascii, EBCDIC, Fieldata).
- Constrain the field positions for sort keys or comparison data into numeric, upper case alphabetic or lower case alphabetic only. Combined numeric, upper case alphabetic, and lower case alphabetic characters in the same key field are acceptable provided that num-

bers, upper case and lower case letters do not occur in the same positions in these keys or comparisons.

This is a restriction to "Alphanumeric" in the Cobol sense of including any character in the computer's character set; Space may appear only in the same positions as letters. Space should not be used in numeric field positions.

- Avoid entirely the use of dense forms (e.g., packed numerics, binary, overpunched numerics, floating point) in sort keys or comparisons.
- Avoid currency symbols, algebraic sign symbols, asterisks, and other special symbols in sort keys or comparisons, unless each appears in a position reserved for it alone. Therefore, these symbols will not disrupt the expected sequences or comparison results.

• Avoid entirely the use of control function characters or delete characters in sort keys or in data to be compared by comparison operations.

Note especially that the collating sequence implied by the native (coded) character set of a computer is not always the same as the collating sequence used in sort procedures by the computer system's hardware or software, and that an endless variety of collating sequences can be established by application programs.

If the above guidelines are observed, it is asserted that the same sort sequences and the same comparison results obtain for Ascii, EBCDIC, or Fieldata and for any other coded character sets which have the properties described above. These guidelines apply to static sort keys or to dynamically generated sort keys.

These guidelines are published to solicit comments, which may be used to expand this subject into a tutorial paper being prepared on this subject.

Comments should be addressed to John L. Little, Room B264, Technology Building, National Bureau of Standards, Washington, D.C., 20234.

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Commission Drops DP System

Variation on an Old Theme: Man Replaces Computer

By Marvin Smalheiser
CW Correspondent

SACRAMENTO — A California commission has found it can do its job better and cheaper — \$1.5 million cheaper — by replacing its computer with humans.

The state Teacher Preparation and Licensing Commission, which was using almost a full shift of a shared state IBM 360/90, said it has just completed a transition back to manual operation that cuts the time of processing teacher credential applications by 900%.

The commission also said it has reduced its staff from 240 to 106.

Charles W. Moss, assistant executive secretary of the commission, set up last July 1, said the savings were achieved after an intensive procedures analysis that streamlined and automated

the teacher credential processing.

The savings are effected largely through a revised system in which the commission accepts only completed applications, greatly reducing file maintenance costs.

The commission either issues a credential or advises the applicant of his deficiency.

The new procedure enables the commission to put all the files on eight microfiche robot files,

which can be pulled "10 times faster" than querying a computer on the 18 terminals it had been using. A credential typist can now process an application for 50 cents, compared to \$9.50 per application on the computer, Moss said.

And the time for processing has been cut from an average of 95 days per application to 10 days.

The computer is in the state's Department of General Services and is used for various other jobs ranging from state apportionment of school funds to accounting of federal funds.

But, said Moss, "it was duplicating a lot of things we have to do manually, anyway."

There were also heavy supervisory costs and expensive file maintenance functions.

Moss said that under the revised operating procedures the commission could still do the work on the computer but the

cost would still be \$9.50 per application, compared to 50 cents manually.

A side benefit of the switch came during the summer when the commission began the transition and hired more than 50 students to help make the change to manual processing. They worked in place of commission personnel who had been advised of the change and had relocated to other jobs early.

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100% Efficiency Will Satisfy Dartmouth T/S

HANOVER, N.H. — A 99.9% operating efficiency rating is the goal of the Dartmouth Time-Sharing System (DTSS) at Dartmouth College.

In December, when students scurried to terminals to complete term projects, the center scored 99.46% uptime, despite eight interruptions to service. But director Thomas Kurtz is convinced a 100% rating is a realistic goal.

The percentage is the amount of uptime in a T/S environment realized out of all scheduled available time, which is 108 hours a week at the Kiewit center, home of DTSS.

Since April the center has registered ratings below 98% for only three months. May, marked by several hardware failures, was rated at 95.7%, and June, 96.9%. In November, when there were problems with power failures and hardware, the rating was 96%.

Power Surges

The greatest obstacle to achieving a rating of 99.9% is power surges and the susceptibility of the Dataseq 30 controllers to these transients, Kurtz noted. System damage caused by such fluctuations can be time-consuming to locate and repair, he added.

"Although we have 98.4% uptime, which is about average for computer systems in general... we will be happy only when the uptime is 99.9% or better," Kurtz asserted.

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Source Data Automation, Part II

Special Report

Simple Terminals May Be Trend of Future

By Ronald A. Frank
Of the CW Staff

One of the key features of an efficient source data system is its ability to prestore all possible "static data." The static data includes all information available before a transaction actually takes place. For example, it is wasteful for a factory worker to enter the date of a transaction into a terminal because this could be done once at the beginning of the day via a "master entry station." If the static data has previously been updated, the operator can concentrate on only the information that identifies and describes the unique transaction he is entering into a source data terminal.

One source data automation authority breaks this classification down into three types of data. These types are described as "constant with the user, constant with the terminal, and variable with the transaction," according to Roy Saltzman of Arthur D. Little.

Application Needs

Once these types have been isolated, the user should next identify the unique needs of his application. He should know what data he wants to capture. "Will the system need a bank balance? Will the operator need to get a part number? Will the reservations clerk want to assign an unoccupied airline seat?"

From the operator standpoint, each terminal can be tailored to specific needs through the use of function keys. As long as these function keys are labeled in a language the operator understands, there will be few training problems involved. And the same basic type of terminal with different function keys theoretically could be used for a variety of applications, Saltzman believes.

"But, typically, the vendors feel these terminals have to be uniquely designed all the way to the very core for their particular application," Saltzman says.

So quite possibly a retail terminal will forever be a retail terminal and not a factory collection terminal (even with some modifications), Saltzman feels.

"There are enough basic differences in the applications that it may not be possible to think in terms of a general-purpose terminal," he says.

Although systems logic indicates a general-purpose terminal is feasible, Saltzman thinks "inertia, politics, and vendor motivation to carve out a special niche for themselves" limit system applications.

If he is correct it would seem the speed

"There are enough basic differences in the applications that it may not be possible to think in terms of a general-purpose terminal."

with which new source data automation systems are implemented lies directly with the potential user.

Whether or not low-cost multi-application source data systems are soon developed would seem to hinge on the ability of the user to make his needs known to the system supplier.

There have been some encouraging examples where the user has defined his parameters, and has helped the vendor design a cost-effective system to meet his needs.

It is interesting to note that in many applications the terminal is a relatively simple device, its characteristics are far

Rohr Corp. employees use a special terminal to talk to a voice response system they call Mabel. The system works in the office or on the factory floor.



from unique, and one can almost picture the same system operating in a different environment, with, as Saltzman says, a few changes to the function keys.

The Rohr Corp. in San Diego, makes such things as major components for airplanes and the cards to be used in San Francisco's new Bart rapid transit system. It is important for Rohr to know where

units are in its assembly cycle on the factory floor.

So some years ago Rohr decided that instead of the conventional punched card one could keep track of production via simple Touch-Tone terminals that could interact with an audio-response-equipped CPU.

Rohr has now combined all its data gathering around simple terminals but the variety of the applications seems almost limitless. The Rohr workers have adapted to working with an audio-response voice, and they affectionately refer to "her" as Mabel. And Mabel has proven an effective labor and cost-saving system, according

"When we put computing power into the hands of 17-year-old clerks, there has to be a radical difference in our systems' approach." — Vern Shatz, vice-president for information systems, Jewell Companies Inc.

User Dilemma: In-House System Or Off-Shelf?

One of the major decisions a user must make when implementing a source data automation system concerns the trade-off between buying vendor-developed equipment and developing a system in-house. Purty Supreme supermarkets have developed an order entry/management system using the Digitronics Data-Verter, an off-the-shelf system, while Jewell Companies Inc. uses a system specifically tailored to its needs.

As Purty clerks walk down the supermarket aisles they note low stock items by recording five-digit order codes into the adding machine keyboard of the Data-Verter.

As the order codes are entered, data is recorded on a mag tape cassette. At preset times the central warehouse polls each store to capture specific order information.

To transmit the data, order information gathered with the Data-Verter is sent using acoustically coupled terminals. The cassettes are mounted onto the terminals for transmission over normal phone lines.

As the system began to cut down on the order-to-delivery cycle, Purty's management found it could add payroll and cash accounting. With each store's payroll transmitted to the DP center the amount of paperwork that had to be sent manually from each store was almost eliminated.

At the central site information is received directly onto full size mag tape reels to be used for direct entry into the CPU.

Jewell System

The mini-based Jewell system is now operating at six different company stores. Significantly, each store has a different operation. "In each case we modified the terminal keyboard and the system to fit the user," according to Vern Shatz, vice-president of information systems.

"When we put computing power into the hands of 17-year-old clerks, there has to be a radical difference in our systems' approach," says Shatz.

Jewell did its own in-house research to implement the system. There were more than 200 changes in the course of development, Shatz said. Because of this needed flexibility Shatz says he is "totally opposed to hardwired technology."

The key to the flexibility which Shatz treasures lies in his ability to modify the system software as required.

(Continued on Page 9)

(Continued on Page 9)

Hotel Guests May See Paperwork Eliminated

Typical of the more unusual types of source data automation systems is the Ho-Tell-it system now operating at more than 25 hotels in Hawaii.

Designed by Computing Management Inc. the system is described as an accounting and management information system for the hotel industry. What makes the system interesting from a source data automation standpoint is its methods of eliminating the usual paperwork that follows a hotel guest during his stay.

For example, guests register-

ing at a hotel with a reservation are asked only a minimal amount of questions upon check-in. Under computer-control, a "reservation form" is displayed on a CRT screen for the desk clerk. Whenever possible, the "CRT form" is already filled in with previously gathered information. The clerk adds any additional detail via a keyboard. The key to the success of the Ho-Tell-it system is its ability to duplicate forms which previously had to be handled manually, according to Terry Brooks, systems

manager at Cinerama Hawaii Hotels.

The key to simplified operation is the function keys, Brooks says. When a desk clerk hits a key marked "reservation," a form is immediately displayed on the screen.

In addition to cutting down on the amount of paperwork needed for each guest, Brooks sees another advantage. Since each "form" is displayed under software control, it is relatively simple to rearrange formats or add new questions. All of the Cinerama ter-

minals access a central 370/145 at CM. Each Bunker Ramo CRT has 16 variable-function keys "which can be equipped with any terminology for the operator, and the software can interpret these in any required way," Brooks says.

As another example of the labor-saving function keys, Brooks calls the "cancel" key.

While cancelling the reservation, the information is "put in limbo" inside the Model 145 "so we can get back to it later if we have to."

In-House System Or Off-Shelf?

(Continued from Page 8)

The Jewel terminal specifications were developed by Shatz and built by Nuclear Data Corp. The keyboard has a 10-key numeric pad with 20 function keys. The function keys are assigned various tasks depending on the application.

The data keyset into each terminal is fed into an interim minicomputer storage. And if a particular mini should malfunction, the transaction entry will be rejected; and the operator can switch to an alternate processor simply by pushing a function key.

The complete on-line monitoring of all store transactions has allowed Jewel to cut down on cash drawer shortages, it has allowed credit check with a minimum of delay, and it has cut down on the need to purchase to gather daily totals according to product.

The versatility of the Jewel system is exemplified by check transactions.

The operator will enter, via the keyboard, certain numbers from the Mic characters at the bottom of the customer's check and this will automatically be compared with approved account numbers. After the system processor has checked for a valid account, it will determine that the check total is within present cash limits previously entered by the store manager. If everything is in order, the approval is given automatically to the



Purity Supreme supermarket clerks gather order/inventory information via Digitronics Data-Venter carts which are self-powered and can be rolled through the store.

operator who completes the transaction.

Both systems improved on earlier manually oriented data gathering. In both applications, the equipment was chosen to simplify the application. And the users agree that selecting specific functions because they will work well with certain equipment is less desirable.

Simplicity May Be Trend

(Continued from Page 8)

according to Richard Canning, editor of EDP Analyzer.

The Rohr system has been in operation since 1967 and its success is due mainly to its conversational capabilities, Rodstrom says. From a design standpoint, Rohr went to Wavetek, the terminal supplier, with a simple requirement.

Since everyone is familiar with the operation of a telephone, Rohr reasoned that a terminal which duplicated all the functions of a phone would be easy to handle. But some say the Rohr-type terminal is limited in its uses. They point out it is not possible to visually verify data on the factory floor via a hard copy, or even a display. This problem is overcome by the voice repetition of Mabel back to the worker whenever there is a question of data validity, Rodstrom says. "You don't need a piece of paper or a printout to validate this type of data," he says.

There are also some peripheral benefits to the Rohr system. "We are almost completely off time cards. There is something about lining up at a time clock to punch out," Rodstrom says.

But there is a problem when every worker crowds to a terminal to tell Mabel it is time to go home. No, says Rodstrom, "we have enough terminals to get 1,500 out of the plant in less than three minutes."

While the Rohr system appears to be tailor-made today, it actually evolved in stages. In 1960 the firm installed a data

collection system that had punched cards fed into keypunches. Rohr had about 60 keypunches at a cost of about \$90/mo.

In 1964, Rodstrom read an article about a Touch-Tone phone application being used by the Bell System to collect data. As an interim step Rohr installed a modified key telephone as an input device to a keypunch.

While that interim method worked well, Rodstrom says it did not provide the "voice response or the control over the input of data." Having proven the effectiveness of the Touch-Tone entry concept, the company next added an audio response system on a 360/50 with the help of IBM in April of 1967.

Finally, the Wavetek terminals were installed with two Wavetek audio response systems. Each handles 64 lines and has a 96-word vocabulary. Rohr still has its 7770 IBM response system in another application.

Does Rodstrom think simple terminals are the trend for source data systems? "Well, we have had a lot of economic results from our system. We have eliminated timekeepers. But then we don't do things like check credit."

"If you keep things simple, your acceptance will be high and your costs will be minimal," Rodstrom says.

Next week's special report looks at passive data capture methods and the early systems that paved the way for today's equipment.

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Editorial

Finesse, Midwestern Style

On Dec. 15 we said: "It seems likely there will be other consolidations of major computer companies in the future. We hope the next one will be carried out with the finesse shown by GE and Honeywell and that we are never again treated to an RCA-type disaster."

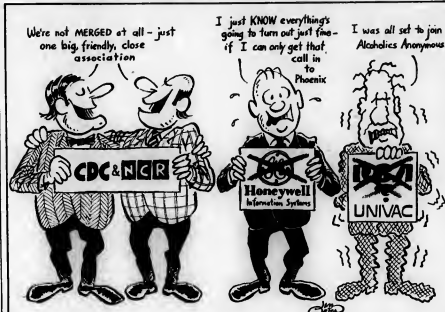
On Jan. 27, NCR and CDC announced their "merger." And they did it with such finesse that the first user reaction was "so what?"

We presume this was exactly the reaction NCR and CDC were aiming for, and we congratulate them on their success.

NCR and CDC will get what they want: economies of scale. And the users will get what they want: no changes, except for the better, in hardware, software, support or vendor personnel.

Now that the other shoe has dropped—sofly—user faith in IBM's competitors is returning. NCR and CDC are to be congratulated for also accomplishing this secondary goal.

Users, How's Your Merger?



Letters to the Editor

Oath of Acceptance Needed To Support Bill of Rights

In response to Alan Taylor's request for a DP professionals' Bill of Rights, it is my belief that not only should such a document exist but an Oath of Acceptance be administered those who venture into the DP arena. The Oath of Acceptance that might be proposed might be worded thusly:

I, (name of individual), having accepted the responsibility of assuming a position in the Society of Computing and Data Processing, do swear (or affirm) that I will, with conscience and regard for my fellow man, observe, uphold, and adhere to the policies and ethics established by the DP Bill of Rights.

Noting that other professions have established their self-governing standards (actuaries, doctors, etc.) maybe, we as DP professionals, should establish more rigorous methods of certifying ourselves and others as computing and data processing professionals. We haven't much to lose in trying and, probably, a considerable amount to gain.

The Society of Computing and Data Processing, which was referenced in the oath, is purely fictitious at this point. Should one be established, its only duties would be regulatory.

It would not be concerned with conferences, the publishing of papers and job

procurement; we already have organizations for these and any involvement with the society would weaken its position.

Philadelphia, Pa.
J. Frank Elmer

'Personal Responsibility' Marks a Professional

The Taylor Report in *Computerworld*, Jan. 19, missed the point as to what the definition of a "professional" is.

In all other industries, the mark of a professional is his willingness to take personal responsibility for any work which carries his signature. When a Certified Professional Engineer (CPE) or Certified Public Accountant (CPA) signs his name, he is personally guaranteeing that the documents are, to the best of his knowledge, complete and accurate and prepared according to the standards of current practice. He is also guaranteeing that all legal requirements (building codes, tax laws, etc.) have been met.

The Computer Bill of Rights which Taylor suggested appears to be saying that it is permissible to produce inaccurate or illegal results from the computer, as long as officials of the company are notified.

If we are to claim professional status for the DP industry, we must be willing to accept responsibility for our own work and hold a loyalty to our professional standards and ethics over our loyalty to our employer. Then and only then, will a CDP have the meaning of a CPE or a CPA.

Charles R. Sierhakov
Collingswood, N.J. 08107

Is the CDP Being Accepted?

I am interested in the acceptance that the CDP Certificate is receiving from the academic community.

If anyone knows some answers to the following questions it would be particularly helpful to me in my present position:

- Can the CDP Certificate be considered terminal preparation for teaching business data processing on the undergraduate level?

- What recognition is being given to the CDP Certificate by the colleges and universities across the country or by any of the various educational associations?

- What is the status of the CDP Certificate, among practitioners in data processing, as evidence of professional achievement?

- Can the CDP in any way be equated

to the CPA Certificate for professional accountants?

Robert A. Kallin
Business Education Department
Central Conn. State College
New Britain, Conn. 06050

DOS: the Simpler Life

Four additional comments on IBM's withdrawal of support for DOS:

"Thank heavens! We can look forward to getting off the merry-go-round of revisions and concentrate on pining the most out of DOS. It has been working pretty well for us over the last year or so. The Class III support offers us an acceptable out."

"I think IBM will announce some sort of virtual memory upgrade for DOS class people in 60 days."

"We're committed to OS because of the need for RJE and more than three job multiprogramming mix. While all of these things have been sold to us as cost reductions, it's strange that our unit production costs never go down."

"Looking back on our DOS to OS conversion, realizing all of the costs involved, maybe we should have accepted the simpler life and stayed with DOS."

Cleveland, Ohio
Donald C. Harder

Married Women in DP?

Joyce Nayer's letter in the Jan. 26 issue brought needed attention to the blatant sexism displayed in *Computerworld* ads. Even your own advertisement for the Computer Caravan shows prejudice. Fewer than 10% of the people in the ad are women.

I have seen some ads for computer conventions that even imply that no female professionals are expected to attend. Such ads frequently describe special plans for "wives accompanying their husbands to the convention," but no mention is made of "husbands accompanying their wives." Married women in the computer field do exist, believe it or not!

I have strong reason to doubt Joyce Nayer's contention that our industry "undoubtedly recognizes the intellectual contributions of women." There is too much evidence to the contrary.

If prejudice against women in the computer field remains strong, their talents may well be drained off into other, less oppressive areas. Can the data processing industry really afford to lose?

Atlanta, Ga.
Ms. Alice E. Davis

The 'Model' as an SA

Referring to Joyce Nayer's letter (CW, Jan. 26), I found it interesting to hear her indictment of DP advertising.

She refers to the Jan. 12 issue where "every ad (except one) using men or women portrayed each sex in its stereotypical role." I'm not sure which one she expected, but hopefully, it was the Fabri-Tek ad (page 29). The "model" shown there—in our MOD30 extension memory—is actually employed by Fabri-Tek as a system analyst, not a secretary or keypunch girl. This only proves that good looking models and liberated women are not necessarily mutually exclusive.

Michael Dries
Fabri-Tek Inc.
Minneapolis, Minn.

Cheers for the User!

Amos 'n' Andy said "rapor, rapce." W.C. Fields said "bugor, bugce." Alan Taylor has added the beautifully apt "user, usee."

User—one who uses a computer process.

Once—one who is used by a computer process.

James E. Hudson

Computer Sciences Corp.
Richardson, Texas

End of Block or SOB?

I was pleased to learn from reader Michael Gershman (CW, Jan. 26) that EOB stands for "End of Block."

The other day when one of my programs hung and messed up a customer's report he mentioned something about a "Start of Block"—guess that's what he meant when he called me a SOB.

Will Perry, CDP
Fort Worth, Texas

Computerworld welcomes comments from its readers. Preference will be given to letters of 150 words or less.

Computerworld reserves the right to edit letters for purposes of clarity and brevity. Letters should be addressed to: Editor, Computerworld, 797 Washington St., Newton, Mass. 02160.



Will Local User Forums Deal With National Issues?

There are a number of items about *Computerworld's* Computer Caravan which look interesting, but the most interesting is the idea of a real user forum.

In the formal title, "Computer Users' Forum and Exposition," it even gets star billing, and I think that's fine. There have often been users in forums before, but too often they have been part of an implied hardware-user alliance, talking about how some particular product

has worked in their installation. Personally, I have never believed that a hardware manufacturer is a user. Instead, I think that people like Dee W. Hock, president of National Bankamerica, has a lot more right to call himself a user. And anyone who read his recent article, "Data Processing Must Serve the Bank Card Carrier" [CW, Jan. 26], will quickly understand that his problems, and what he wants out of data processing, are something totally different than a description of what a particular group of hardware manufacturers happens to provide.

Why Dissatisfied?

This automatic manufacturer/users-technical staff alliance has existed for the past 20 years,

and may well be why Hock and many other corporate presidents are dissatisfied with data processing. I believe it is the primary reason why there is currently such a wave of anti-computer feeling, and also why some of the organizations which might have succeeded if more thought were given to them, have, in fact, been failures.

As such, I like the idea of the Users' Forum in the cross-country Computer Caravan from which vendors are excluded from the platform, but where real professionals—practicing people—will gather to discuss from experience the opportunities, the record and the challenges to data processing.

Another thing I like about the forum is the whole concept of not having the same group traveling with the exhibition. The Computer Caravan has many points in common with the big computer exhibitions/conferences, but there is one very great difference. In the users' area the personalities on the platform are drawn mainly from the local areas, so that there will be a continuing opportunity to talk to them, to check out ideas afterwards. This means recognition will be given to the factors that affect local regions, and this regionalization may allow for more understanding than could be found at the larger conferences with national speakers.

National Questions

I am certain those forums will provide a chance to really immerse data processing. Whether they will do so, of course, depends largely on the audience, and the topics considered. Clearly local topics will be considered in depth—but will not be national ones?

I would like to hope these technical workshops don't ignore some of the national questions. I would like them to consider Hock's challenge to the DP profession: How can we make people more important than paper? What stands in our way? How can it be removed?

I would like the workshops to consider whether or not it is reasonable to put out output which does not cross-feed? Or which is inaccurate? (This idea, that all such output is wrong, comes from Al Kocotek, chairman of the Society of Certified Data Processors' Unprofessional Practices Committee, who points out that print routines can be written to check cross-feeding.) I know there are many more immediate hardware, software and local items for most of the people attending the Computer Caravan workshops—but still the speakers and the participants are part of the national DP community. While local experts

bring good discussion forward, the national and, indeed international, needs demand some discussion.

I hope to be in some of the user forums—at the back of the room—and I seriously hope the feelings of the profession on these matters are checked so that we can later show again what the DP professional believes, and people are more important than paper, and the ideas which will help this come true.

So, when the Computer Caravan comes into your area, please

do not automatically assume that the Users' Forum is simply a showcase for manufacturers' mouthpieces. It is an imaginative, and, I believe, unique attempt where the real user deserves plenty of platform space. Enjoy it, profit technically from it, but also remember to check on professionalism.

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The Taylor Report

By Alan Taylor, CDP



This automatic manufacturer/user alliance, talking about how some particular product

Forced Obsolescence?

Looking at the tape scene over the past eight years one is struck by the number of different non-compatible tape drives IBM has offered the user. There were the 729s. Then along with the 360 came the 800 bit/in. 2400 series drives. No upgrade was possible from the 729s. A year later came the 1,600 bit/in. 2400s. Again, no upgrading of the drives, not even from the 2400s.

After that came the 2420s, and just last year came the 3420s. Again, no upgrading possible. Altogether there have been some five major independent lines, all of which are still in the product line.

Equivalent tape units have also been available from the independent peripheral manufacturers. But there has always

Taylor Thoughts

been a significant difference between the independent drives and those from IBM.

The independents were somehow able to provide for upgrading of drives. The drives sold for replacing a 729 were able to be moved onto the 360. The drives sold to replace the 800 bit/in. 2400s were able to be moved up to the 1,600 bit/in. and for the 2420, or the 3420 systems!

The independents could do it, so it was not a question of technical characteristics. What was the reason then? This is a question I have been puzzling over for years.

I think I may have found the answer. It is a very simple answer, generally based on Return On Investment (ROI) planning.

In product planning when an item is going on the market the costs of providing some facility are weighed against the return it will provide in the way of increased markets.

In providing for these conversions from one type of drive to another there is a definite addition to the cost of the unit. Typically it might be providing two ways of encoding the signals (Phase Encoding and NRZI), and not just one. This meant doubling certain parts of the electronics, and costs some money.

As far as the independents were concerned, this additional expense was justified because it could substantially increase their market. It might, for instance, increase it from 10% of the total market to 11% of the total market—a respectable improvement of 10% in the size of their market.

But, on the other hand, the situation in the IBM product planning would not look the same. Here the designers would be looking at increasing the sales, say, from 89% of the market to 90% of the market. This is only an increase of about 1.1%, and the additional costs could well outweigh the benefits IBM would accrue.

Of course, if IBM had been smaller in the tape drive market, then the ROI position would have changed. Then users might not have had to sit still, while equipment was being obsolesced five times in eight years, raising costs of computing unnecessarily.

But at least I can now see how the independents can give more value for the money than the giants—and the danger involved in assuming that the giant must lead the way technically. Technically they may be able to do so, but from a marketing point of view it is much more expensive for the giants to innovate than it is for the dwarfs who have more to gain.

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AMERICAN KEY PUNCH

DP the Key for Printing Intricate Arabic Text

By Robert L. Glas

Special to Computerworld

SEATTLE—How does one automate the production of manuscripts in the Arabic language?

Complications: the Arabic printed language is a script language and each of the 40 different characters in the language takes on an average of six different shapes.

Dr. Pierre MacKay, associate professor in classics, Near Eastern Languages and comparative literature at the University of Washington, is working on a solution with the aid of a computer.

The solution takes on several facets:

- Entry of the text into a computer. At present, MacKay encodes the Arabic text in character pair form, an English alphabet character followed by a "diacritical"

character (for example, the English letter "a" represents one Arabic character and its sound; "sh" represents the Arabic character, and "y" represents the Arabic emphatic "ay" sound). The character pairs are thus phonetic representations of the comparable Arabic text.

Experiments are also being conducted using a graphics input device with a keyboard mask containing Arabic script characters, thus allowing the direct keying of Arabic text.

- Conversion of the input text into internal form, followed by conversion of text characters into their context-sensitive equivalents (the letter "b," for example, may take on 11 different shapes depending on preceding and following characters in a word).

- Output of the text in script form. At

بسم الله الرحمن الرحيم
الحمد لله الذي هدانا لهذا
ما كنا لنهتدي لولا أن هدانا الله
الحمد لله الذي هدانا لهذا
ما كنا لنهتدي لولا أن هدانا الله
الحمد لله الذي هدانا لهذا
ما كنا لنهتدي لولا أن هدانا الله
الحمد لله الذي هدانا لهذا
ما كنا لنهتدي لولا أن هدانا الله

The Arabic script is produced by computerized techniques utilizing a Calcomp plotter. Each character is made up of minuscule vertical lines. The text itself is a traditional prayer.

present, output is sent to a Calcomp plotter where the script characters are "printed." MacKay is now working on converting the Calcomp format to a Videocomp electronic typesetting format for direct production of printed manuscripts.

350 Shapes

There is no economical way to produce Arabic manuscripts in this country at the

present time. Handsetting of the script, considering that there are 350 different script shapes, is not feasible. Thus MacKay's solution is more than a new way to solve the problem; it is presently the only way.

The problem is, in fact, worldwide in scope. Labor costs are rising in the countries where Arabic is the native language, and handsetting of type is becoming economically marginal even there. A conference in Cairo in late November dealt with this problem; the conference recommended reducing the number of fonts in the language. MacKay refers to this solution as modifying the language to suit the technology; his own solution, he feels, expands the technology to encompass the language.

MacKay's enthusiasm for his project is contagious. A PhD thesis project is now under way on the use of optical scanning of Arabic script text, to further reduce the problem of encoding the input. The technique is technically feasible if it is limited to printed fonts, MacKay feels, but it is economically dubious at the present.

The automated production of Arabic language text obviously has implications for manuscript publication. But MacKay has another goal in mind. With the aid of automation, he hopes, scholars will directly control the preparation, and thus the quality, of the text they produce (as in the 16th and 17th centuries).

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Simulation Speeding Jet Engine Testing

ARNOLD AFS, Tenn. — A major expansion in the use of computers to test aircraft jet engines under simulated flight conditions has been completed at the Air Force Systems Command's Arnold Engineering Development Center (AEDC).

The ability of the expanded system to display data in near real-time and to compare this data with performance expectations filed in its memory allows engineers to evaluate in minutes the results of performance tests that previously could not be analyzed in less than a day.

"By significantly reducing test times in our environmental test cells, we can greatly accelerate the development of atmospheric flight systems of the future," said Capt. Michael Vasilik, AEDC scientist in charge of computer planning. "At the same time, this will reduce development costs of the military services, government agencies and engine manufacturers."

"A major side benefit," he continued, "is a reduction in the wear and tear on the experimental and prototype engines we test (which are usually built with a short life expectancy) as well as on our own facilities."

Key element in the expansion of computer capacity was the installation of an IBM 370/155 to process millions of individual measurements of performance.

The computer gives test engineers the flexibility to display and examine any required data in minutes while the test is still under way.

Before the new computer was installed, engineers had to examine data through the use of hand plots, side-by-side visual examination and other laborious means.



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CALCOMP

February 9, 1972

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Random Notes

'Animal' Puts Cassette Data**Info User-Chosen Pattern:**

LOS ANGELES—The complex editing and conversion of data recorded on digital cassettes to formats acceptable to a user's application program is handled easily by A New Interpretive Method for Analysis of Language (Animal). The table-driven package for syntactical recognition and transformation of significant data elements is available from Optimum Inputs.

Animal can be adapted at execution time to handle changes in data formats being read or being generated. Restructuring of the tables takes hours instead of the weeks that might be required to write conversion programs in Cobol or Assembler. The package operates under OS/360 and leases for about \$360/mo, the company said, from 2301 Rosemead Road, 90024.

Non-Programmers Use 'Writer'**As Part of Ancom GL System**

SAN DIEGO—A Report Writer package, to be used by non-programming personnel to produce financial reports on IBM 360/370, Burroughs B2560/3600 or Honeywell 200 Series CPUs, has been announced by Ancom Systems.

Completion of simple instructions is all that is needed to format a new report, the company said, and specification to be used more than once may be stored for recall. The Report Writer can be used in conjunction with Ancom's General Ledger System or as a stand-alone package, and sells for \$5,000. First deliveries will be made in March, from 1250 Sixth Ave., 92101.

'Multiple Access' Facilities Available in New York Area

NEW YORK—The interactive time-sharing and remote batch capabilities of Multiple Access Ltd. of Toronto are now available to users in New Jersey, Connecticut, New York City and part of New York State, through Multiple Access Inc., 420 Lexington Ave., 10017.

The Multiple Access services include both commercial and scientific applications, and languages with which users may write their own programs. The network is based on large-scale CDC 3600 and 8600 systems in Canada, which can be accessed over voice-grade lines through multiplexers in New York and Toronto.

Object Code for Any Mini**Parameters Define Assembler Output**

By Don Levitt
of the CW staff

ENCINO, Calif.—A comprehensive cross-assembler that runs on an IBM 360 and can be restructured at execution time to produce object code for "any" mini-computer is available from Computer Applied Systems Inc. (Casi).

Parameters that tailor the system's output to a particular target machine can be changed between batched assemblies so that code from one processing run could be destined for several different minis. Users with a mix of equipment at multiple sites could then generate matching logic for all the machines at one time, Casi suggested.

Special options, not available through software provided by the mini vendor, could be created by imaginative use of the cross-assembler parameters. Written in BAL and operating under DOS, the basic system is said to accommodate more than 100 symbolic operation codes of various binary formats.

The system includes 14 pseudo-operation codes and support of relocatable symbolic expressions, as well as the abil-

ity to define Common storage. Parenthetical expressions available through the cross-assembler include arithmetic, relational and logical operators.

More than 300 symbols, up to eight characters long, can be handled in a 12K DOS partition, with the new software. Literals and indirect addressing, if appropriate for the target mini, can also be supported by the Casi package.

Optional features are said to include a macro capability, floating point data conversion and conditional statement generation.

Although intended to speed program development for minis, by utilizing the faster processing time and faster I/O devices of a 360, the Casi cross-assembler is not inherently limited to minis as target machines, nor to machines of any particular word length.

The basic Casi package costs \$4,000 and can be leased for \$100/mo, including object code, documentation, implementation of the first set of parameters, and explanation of how others should be handled.

Casi is at 18075 Ventura Blvd., 91316.

IBM 3270 CRT Terminals Backed For Remote Use by 'Video/370'

WHITE PLAINS, N.Y.—A control program for IBM's 3270 information display system, Video/370, permits use of the CRTs at remote data collection points, and eases data entry wherever the units are used.

IBM has also announced Version II of Data/360 which allows 3270s to be inter-mixed with IBM 2260 display stations for data entry operations.

Within Video/370 is the logic necessary to support data transmission over the Bell switched network, or other long distance communications lines, IBM said.

Video/370 also provides step-by-step guidance as an operator enters data in blanks on a displayed format, and highlighting of errors on the CRT screen for easy correction. In addition, it allows the operator to retrieve records already stored for verification and correction.

The program product supports the use of security codes that allow only authorized persons to enter or access data through the 3270s.

Video/370 and Version II of Data/360 are scheduled for release in the third quarter of 1972, with monthly license charges of \$210 for the former and \$125 for the latter, for either OS or DOS users.

'Culprit' Uses 'Total' Data Base

BOSTON—Users of the Total data base management system from Cincom Systems Inc. will write programs utilizing the Culprit output processors from Cullinane Corp. This link-up is now possible with a Total/Culprit interface module, developed jointly by Cullinane and General Tire and Rubber Co. of Akron.

Total, by itself, is what the Codasyl Data Base report considers a "host language" system. It provides a system of data base management and manipulation, but users are expected to write complete programs in their choice of language in order to utilize the Total files.

Culprit is a highly generalized information retrieval and report generator system. Through parameters entered at execution time, users can generate reports in "load-and-go" mode, with the flexibility to change specifications and return quickly if the need arises.

The Total/Culprit interface allows the Total user to create his reports in the same "load-and-go" mode. The basic Culprit includes stored generalized routines that can be invoked by any user. Specified versions of Culprit, such as the EDP Auditor package, include stored routines tailored to specific operations.

The interface module lets the Culprit user retrieve data from single or multiple

file Total data bases in random or sequential mode, according to Cullinane.

Total/Culprit operates on the basis of 8-character data element names, which are cataloged in a dictionary so that users may note the names directly, without reference to the particular file in which they are found.

The Total/Culprit interface, including the basic Culprit but not Total, is available for IBM 360 users for a price "in the \$16,000 range," Cullinane said.

Cullinane Corp. is at One Boston Place.

DOS Users Gain Tailored Job Streams From JCL Cataloged Under 'Scheduler'

LAWRENCE, N.Y.—DOS/360 users can eliminate most of the handling of JCL cards, and yet maintain very flexible control over the content of their JCL streams, with the Task Scheduler package from Ultra-Logic Software Marketing Co. The scheduler allows DOS installations to catalog standard JCL job streams in a manner similar to the OS Procedure Library. Since it utilizes either the Sysps or a private source statement library, the package effectively includes all of the DOS support for those operations.

While it permits the user to invoke job streams as they are cataloged, the Task

Scheduler also allows him to work with portions of the stored JCL. Through either a task initiator card or a console command, the user may piece together completely reorganized JCL job streams as execution time.

The stored job streams are not altered in any way under either of these options, but the job stream used is tailored to the work to be done.

The program is priced at \$1,600 on a perpetual lease basis.

Ultra-Logic can be reached through P.O. Box 246, 11559.

Value Computing, The Innovative Schedulers...Case History No. 6

A large service company with over 5000 employees, billing over 500,000 accounts and operating System 370/155 with a million bytes of core, 16 tape drives, six 3530's and an associated number of readers, printers and punches; and OS/MFT release 20.1.

This organization utilizes an automated job scheduling and control system installed by Value Computing. Schedules are produced hourly a day; in two shifts in operations, more than 500 jobs are processed. On a monthly basis, an average of 5000 jobs are being processed concurrently and the system is active. With two shifts, five days a week, that means nearly 2600 hours of throughput.

The outstanding success is partly due to the discipline and organization afforded by the Value Computing system, and also to the "task-oriented" get-

zation. Nothing can fully offset an investment in a good operations staff.

Program testing is given a single code assigned to each of seven 100K partitions. Production class codes are also assigned to each of these partitions but at a higher priority.

Using the Value Computing scheduler, production jobs are released, under operator control, to the operating system as the schedule indicates. The scheduling algorithm has already insured resource availability. Remote tests, link edits, and compiles are read onto a special job queue. Thus, while operators are concerned only with production jobs, production and interrelationships compiles, link edits, and tests are automatically "taking up the slack" in any job. But for resources, however, production gets pri-

For more details about this success story, and other actual case histories, contact Value Computing Inc., The Innovative Schedulers.

Vincent Barnman, President
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INTERRUPTED
INVALID KEY
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LABEL OVERFLOW
NAME USED
NO JCS
NO JCS END
NO PROGRAM
NO RECORDS
NO UPDATE
NOT IN JOBFIL
NOT READY
PROCEED
READY
RECORD < 16
REKEY
STAT NOT C
STAT NOT I
STORED
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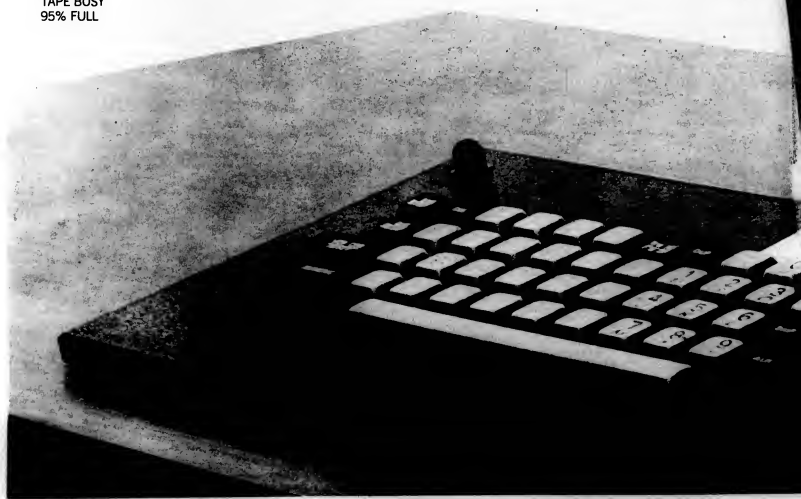
from 1 to 8 keystations. It has a disc capacity of 5,000 user records, based on 125 characters per record, and rents for as low as \$120 a month per keystation.

System 1302 offers a larger disc capacity of 18,000 user records and accommodates from 1 to 16 keystations. Rent is as low as \$101 a month per keystation.

Both systems are completely compatible. Keystation operation is identical. And the 1301 can be expanded to 1302 performance as growth requires.

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Bell Readies Display Device

By Ronald A. Frank
Of the CW staff

With AT&T testing a new display device and Western Union's Data Services Co. adding the GE Terminal, the carriers appear to be directing themselves to the needs of the data user.

The Bell System will soon begin in-house tests of a new Communications Display Terminal (CDT) built on a trial basis by AT&T's subsidiary, Teletype Corp.

Tests of the unit, which Bell refers to as a "soft printing" device, will begin in the spring at about three test sites. Although few details have been released about the new unit, it has been described as a rather "cumbersome" CRT display by those who have seen engineering models demonstrated.

"This is a completely new communicating teletypewriter which has both soft printing and hard printing capabilities. It will be fully compatible with other Data Speed products," an AT&T source said.

Sanders Dial-Up Modem Has Reverse Channel

NASHUA, N.H. — Sanders Associates has a 1,200 bit/sec modem for use on dial-up lines. Called the 12A, the modem has a reverse channel capability that can operate at 5 or 150 bit/sec. An automatic answer feature is also available. The modem, priced at \$610 to \$635, depending on options, is compatible with a Bell 202C data set.

The Sanders 12A can pay for itself in about 18 months on a purchase/write-off basis, according to a company spokesman. The firm is at Daniel Webster Highway South, 03060.

Teletype Co. has already demonstrated early versions of the CDT to some companies. This unit was described as a "rather large and expensive CRT unit in its present form. Certainly not the type of unit in the price range that users are looking for," according to an officer of a company that had the Teletype demonstration.

Data Services Co. will offer the Terminate unit for about \$125/mo without modem. It will be called the Exchange Data Terminal (EDT) 300 and is scheduled for first delivery in February.

Options include the addition of WU's standard TTY modem which is available with acoustic coupler for originate-only with answer-back at \$15/mo, or originate/receive at \$20/mo. A hard-wired version with DAA will cost \$15/mo, added to the basic terminal cost.

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The Novar 5-11 Recording Adding Machine performs all standard functions, and records the data off-line on a Novar tape cartridge. Transmission can be made from any Novar terminal that has a tape recorder—to another terminal, or to a remote computer.

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GTE INFORMATION SYSTEMS

February 9, 1972

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Bits & Pieces

Tape Cassette Adapter

To Portacom Data Terminal

STAMFORD, Conn. — Data Products Corp. has added a magnetic tape cassette drive with editing capability to its Portacom data terminal.

The cassette option, the company said, increases the terminal's transmission rate from 10 char/sec to 30 char/sec and is suitable for data rate buffering, data collection or program preparation. Data may be entered from a keyboard to the tape office for later transmission.

The cassette system is priced at \$1,450. Delivery is 90-120 days from 17 Amelia Place, 06902.

Multiplexed Converter Connects Calculator to 250 R/A Inputs

OAKLAND, Calif. — Series 7150 multiplexed analog-to-digital converters from Fluidyne Instrumentation are designed to be used with Wang Laboratories 800 and 750 programmable desk calculators to measure up to 250 random access input/sec for on-line acquisition.

Unipolar successive approximation conversion methods are used with high-speed sample-and-hold systems having aperture times of 20 μ sec or less. A 12-bit bipolar version utilizing dual-slope integration provides excellent noise immunity combined with input rates of 100 to 160 input/sec, the company said. Up to 64 double or 128 single-ended inputs can be provided in multiples of 16; input ranges are 1 to 10 Vdc.

The 7150 is priced at \$3,650. Delivery is from stock from 470 27th St., 94612.

Varian Prices Include Options

IRVINE, Calif. — By including features as standard equipment that were formerly extra cost options, Varian has effectively cut the prices of two models in its 620 line of minicomputers.

The inclusion of memory protect, optional instruction set (including hardware multiply and divide), real-time clock and power-failure restart in the \$10,500 model of the Varian 620/G saves the user \$3,700, or about 27%. The 620/L is available with a similar package of four former options included in its standard price of \$5,400, a savings of \$1,650, or almost 23%, for the user who wants them.

Stencil Design Stops Wrinkles

NORFOLK, Va. — Designed to be prepared on a computer, the printer and to prevent "flipping" and "wrinkling" during forms stacking, the Twin-Tape Cline-N Stencil is available from Mason Marking Systems.

The stencils are taped on the bottom as well as at the top, the company explained. They are priced from \$20.50 to \$38.40 per thousand. Delivery is two weeks. Samples are available from Box 88, 23501.

Log Extensions Raise Keypunch

FAIRFIELD, N.J. — Log extensions for IBM 326 and 328 keypunches, from Educational Data Sciences, are designed to allow computer operators and programmers to punch cards while in a standing position.

The legs have three positions within 4-in. span and improve the speed and accuracy of keypunching, according to the company. The extensions are priced at \$19.95 and are available from stock from 389 Passaic Ave., 07066.

Custom Chain Can Eliminate Problems

By Frank Plasta

or the csw staff

Users who have had to decide between OCR fonts that humans have difficulty reading and conventional fonts that pose problems in machine comprehension could solve their problems by employing both at once.

The solution could be to have the line printer equipped with both conventional and OCR fonts, allowing the use of either font not only on the same pass, but also on the same print lines.

Mixed Chance

Even though the font-handling capability of such printers as the IBM 1403 can be changed or adapted quickly and without great expense, users have failed to take advantage of this compromise.

The OCR font could be placed on the chain/train by replacing those slugs that would normally be used for lower-case alphabets or an alternate set of upper-case characters. Numbers and special characters needed by the OCR system can be accommodated in the 240-character complement, for example, of the 1403-N1 printer.

The change is relatively easy to make. The user has to order

a set of slugs from IBM to replace existing slugs on the chain/train. The number of slugs that are needed will vary according to the model of printer being used, with either two or three characters on each slug. The charge for this, on a one-time basis, is \$20 for the first slug and \$15 for each additional slug. This, of course, is in addition to the cost of the interchangeable chain cartridge adapters and cartridges on the 1403 and features needed by various systems configurations to adapt them to a non-standard printing capability.

In actual use, the combination chain/train would be used in its 1403 font to print data that does not have to be machine readable, and in any OCR font, such as OCR-A or OCR-B, for the items the machine would have to read. Data that has to be read by both humans and machines could easily and inexpensively be printed in both fonts, with the conventional font as a parenthetical entry after the OCR entry.

The availability of special OCR characters not well known by the general public could also allow some measure of coding on return documents that would not be too obvious to the casual observer.

The special chains are available on a routine basis from any IBM sales office by ordering the character slugs needed.

Modcomp Offers Communications Minis

FORT LAUDERDALE, Fla. — Two microprogrammed minicomputers, two line multiplexers and interfaces to adapt them to IBM, CDC and XDS computers are the first communications-directed products from Modular Computer Systems, Inc.

The larger CPU, the Modcomp III Communications Processor, is based on the Modcomp III mini and incorporates microprogrammed firmware designed to format messages and check them for 200,000,000 bytes/sec.

The Modcomp I Communications Processor is to be used as a remote terminal or remote data collection controller. It contains an internal modem that enables direct connection to a communications line.

Data Transfer

A Universal Multiplexer can be used with the Modcomp III and can handle up to 64 full-duplex synchronous or asynchronous lines. Blocks of data can be transferred concurrently on all lines or to form memory on a cycle-sliding basis. This leaves the computer free to perform formatting, checking and overhead functions, using the firmware, the company said.

The Asynchronous Multiplexer can be attached to either the Modcomp I or Modcomp III and can handle up to 128 full-duplex lines.

The Modcomp III is intended for use in line concentration, preprocessing and terminal control applications. The unit's firmware processing capabilities enable an entire message to be processed by the repetitive execution of one macro instruction.

Character Deletion

The deletion of syntax characters and the movement of text from an input file to main memory takes 5 μ sec, with an addition 2 to 10 μ sec needed to process control characters, resulting in average message processing rates of nearly 200,000 char./sec.

The Modcomp III features five general-purpose registers and up to 65K words of core memory with a cycle time of 800 nsec. The CPU cycle time is 200 nsec. A Modcomp III with 4K words of memory and firmware sells for \$14,500. First delivery will be this month.

The Modcomp I can be connected directly to a telephone or other communication

lines through its built-in modem. The asynchronous full-duplex modem operates at rates to 9,600 bit/sec. The Modcomp I can also be obtained with any external controller, capable of being connected to an external RS 232C-compatible modem.

The smaller mini is available with a choice of memory. Either 800 nsec core memory of 512 to 32K words or solid state memory in read-only or read-write form can be specified. The unit can be configured with a combination of read-only memory for storing the control program and read-write memory for buffering communications information, for use as an unattended terminal.

The price of the Modcomp I with 4K words of core memory, modem and con-

trols is \$6,400. First shipments were made late last month, the company said.

Multiplexers

The communications multiplexers are designed for a variety of line concentration and preprocessing applications. The Asynchronous Multiplexer can handle up to 128 full-duplex channels at rates up to 9,600 bit/sec/line. The price of the basic multiplexer is \$1,600. An RS 232C, TTL or current loop interface is available at \$400/line.

The Universal Multiplexer can handle up to 64 full-duplex lines with line rates to 50K bit/sec. The price of the device is \$400/line. First shipments of multiplexers will be made this month from 2709 N. Dixie Highway, 33308.

Microprogrammed Control Marks Sanders Graphics CRT Terminal

NASHUA, N.H. — Sanders Data Systems, Inc. has added a low-cost graphic display system, intended for use in process control, computer-aided design, simulation and command and control applications, to its Advanced Data Display System series of terminals.

The Add9/900, Model L, in its basic configuration, includes a digital display controller with microprogramming and suboutline capability, constant-velocity vector/position generator, 22-stroke ASCII character generator, dual display channel and a 21-in. CRT.

The minimum vocabulary of 64 ASCII characters can be expanded to 128, including 96 standard and 32 field-programmable special characters.

The dual output channels can accommodate up to six CRTs. An optional additional dual channel unit can handle up to six more CRTs.

Simultaneous DP

The Add9/900 features inherent simultaneous data processing and display retrace capability. The microprogrammed display controller uses both hardware and software to achieve optimum performance and includes an automatic suboutline nesting capability.

The Add9/900 features selective 360-degree character and vector rotation. A

Sanders Add9/900, Model L Terminal.

conic generator, designed to provide arc segments, circles and ellipses of up to full-screen diameter, is optional.

Interfaces are available to adapt the terminal to such minicomputers as the Honeywell DDP516, XDS Sigma 2 and Sigma 3 and the SEL 810B as well as the Varian 620. Varian-equipped models can be, in turn, connected to a variety of computers including the IBM 360, DEC PDP-10, Honeywell 6000, XDS Sigma 5 and Sigma 7 and the CDC 3300.

The basic version of the Add9/900 Model L is priced at \$35,900. First deliveries will be made in June from Daniel Webster Highway, South, 03060.

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The Format

Each Day 9:00-9:40 Keynote address by a nationally known expert — an independent, not a vendor — on the day's main subject. Sets the stage for discussions.

9:40-10:30 Panel discussion led by regional experts chosen for their progressive management principles. Questions encouraged.

10:40-11:45 Workshops — panel members conduct separate workshops. Your specific questions fielded, worked out.

12:15-1:30 Conference luncheon — keynote speaker summarizes chief points covered during panels and workshops.

1:00-9:00 Exhibits open, stay open till 9. Exhibitors will show the latest in hardware, software, services.

The Subjects

First Day: Data Entry

Keynote speaker: Lawrence Feidelman, President, Management Information Corp., Cherry Hill, N.J.; Editor, *Data Entry Today*.

Panels and workshops will be grouped by these four subjects:

- Key punch replacement; key to tape, disc and cassette devices.
- OCR.
- Intelligent terminals — distributed processing.
- Direct data entry/source data automation.

Second Day: Data Communications: The Choices

Keynote speaker: Dr. Dixon Doll, Data Communications Consultant, faculty member, Graduate School of Business, Eastern Michigan University.

Panels and workshops will be grouped by these four subjects:

- Communications equipment from main-frame makers and common carriers.
- Communications equipment from independent suppliers.
- Data transmission via private (lines, microwave) networks.
- Data transmission via carriers (lines, microwave).

Third Day: Operational Efficiency

Keynote speaker: Charles Lecht, President, Advanced Computer Techniques, N.Y., N.Y.; author of *Managing Computer Programming*.

Panels and workshops will be grouped by these four subjects:

- Core extensions.
- System/utility software modifications.
- Independent peripheral usage.
- Dedicated systems vs. general purpose computers.

Panel Members & Workshop Leaders

The regional experts who will run the panels and workshops have been chosen from a wide range of firms and institutions. Some will participate in more than one session, depending on their experience and expertise.

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CI Notes

3 European Firms Merge

MUNICH — Siemens of Munich, CII of France and Philips of The Netherlands have announced they will merge their computer operations to compete more effectively in the field.

Siemens, which said the formal agreement will be signed soon, said that research and production in the computer field would be combined to give the new venture just under 10% of the European market with sales of around \$600 million.

RCA Realigns DP Management

MARLBORO, Mass. — In the wake of layoffs that pared another 280 people from the staff of RCA's defense computer division, the firm has realigned its top computer division management.

Edgar H. Griffiths, RCA executive vice-president for services, has also assumed responsibility for the Computer Systems Division, and Julius Koppelman, a division vice-president, has responsibility for phasing the firm out of the computer business.

L. Edwin Donagan, Jr., the IBM whiz kid who was to lead RCA to the number two slot in the industry, will continue as an RCA vice-president on "special assignments."

DOT to Be Tested

NEWTON, Mass. — Cambridge Memories, Inc., has been awarded the second phase of a U.S. Air Force contract to evaluate the radiation hardness characteristics of its proprietary magnetic film memory using Do-main Tip (DOT) technology.

The study is designed to test the effects of both gamma and neutron radiation on the DOT memory units. "Initial testing of the effects of such radiation indicate that the DOT units are significantly more resistant to radiation than both bipolar and MOS technology," according to Dr. Robert J. Spain, CMI's director of research.

Supershorts

University Computing Co. is consolidating all of its computing service operations in the U.S. into a new Computer Utility Group.

Final testing of a digital data system which ties in six air defense systems in the Japanese area has been completed. Successful completion of testing has been done by the Air Force Systems Command's Electronic Systems Division.

C. Itoh & Co., Ltd., of Japan, has reached an agreement with Inforax, Inc. to act as sole distributor in Japan of the Inforax 1301 and 1302 data entry systems.

Computer Automation, Inc., has received a contract for approximately \$1 million from General Computer Systems, Inc., of Dallas, Texas, for its Alpha minicomputers.

Mitsubishi Shoji Kaisha, Ltd., and Mitsui & Co., Ltd. will market computer software and consulting services of McDonnell Douglas Automation Co. in Japan.

Industry Reaction

NCR-CDC Joint Venture 'Makes Sense'

By E. Drake Lundell Jr.
Of the CW Staff

NEW YORK — "The move makes sense."

That's how many computer industry sources have reacted to the joint venture between NCR and Control Data Corp. in the manufacturing of peripheral equipment and in the development of a future line of compatible mainframe computers.

In addition, many viewed the move as more of a plus for NCR than for Control Data, even though the ramifications will be good for both companies, they said.

"NCR is still finding some problems with head crashes on its disk drives," one observer said, "and this move should give them a better disk product," since future NCR disk units will be manufactured by CDC.

"On the other hand," he added, "I don't see too many advantages for CDC except that it will enable them to market

integrated systems with several small processors tied into one of their large machines."

"I think the move will let both firms develop better peripheral units," another source said, "without having to bear all of the research and development costs alone. This should be a bonus to both NCR and CDC," he added.

In fact, the sharing of research in both the peripherals area and in the development of future mainframe architecture was the main benefit that industry observers saw in the move.

"Neither of them really had the resources to compete against products offered by IBM across the board," another source said. "Sure CDC had good disk drives that could compete, but they really need a complete line that is as good as their disk units," he added.

Last year NCR accounted for 3.9% in value of the computers shipped and Con-

trol Data had a 2.7% market share, according to figures compiled by International Data Corp.

At the same time, Honeywell, strengthened by its merger with GE, accounted for 8.3% of the shipments and Univac 6.3%. If Univac's figures are combined with the RCA shipments for last year, it would give it a 9.7% share of the 1971 shipments.

Many observers have said that a firm must have close to a 10% share of the market to be able to generate enough revenues to keep it competitive and supply the large cash need to support both hardware and software research and development.

The cooperative arrangement between NCR and Control Data — while not a merger — will give the joint venture a 6.6% share of the industry's revenues, according to the 1971 figures — much closer to the magic 10% mark.

European DP Growth Rate To Slow Down: Commerce

By a CW Staff Writer

WASHINGTON, D.C. — Figures recently released by the U.S. Department of Commerce on the data processing market in three European countries generally reflect cooling off trends in their respective economies.

However, certain bright spots shine through the overall slow-down in EDP growth rates.

Sales of DP equipment in Sweden are faring better than other types of equipment, according to Commerce, but proceeding at a slower pace than in the past.

Market projections place the annual growth rate in computer usage between 7% to 8% through 1975, compared with almost 30% since 1964. This means about 50 to 55 new installations will be added each year. But in value, the growth rate will be somewhat higher, as costs are expected to rise, Commerce noted.

The Netherlands

In The Netherlands, "suppliers expect computer . . . sales in 1971 to exceed the record 1970 level by 30%, for a total of \$250 million, according to Commerce. One indication of the rise in installations is that DP employment is up 30%.

But, the latter half of 1971 showed signs of a declining growth rate in the Dutch computer market, Commerce noted.

Some industry sources estimate the installed base in The Netherlands in mid-1971 as 1,719 computers, an increase of almost 400 in one year. Commerce noted, U.S.-affiliated manufacturers shared 85% of the Dutch market in mid-1971, and dominated the super computer range. IBM held about 50% of the market in 1971, followed by Honeywell-Bull, 20%, and Philips, 10%, followed by ICL and Siemens.

Although the French DP market rose by 34% to \$436.4 million in 1970, Commerce projects a 15% to 20% annual increase in the French DP market. Sales of terminals, peripherals and small computers are expected to exceed the general growth rate. Imports rose 51% to \$334.8 million while exports totaled \$298.4 million, up 44.5%.

The U.S. was the largest single country exporter to France, and supplies 17.7% of the market. In 1970, an increase of 46% from 1969. European Economic Community was the principal source of DP equipment imported in 1970, accounting for \$141.4 million in shipments in 1970.



Caravan Camel

Calcomp's camel and John Feeley of Dailey & Associates check out their plans for Calcomp's participation in the Computer Caravan sponsored by Computerworld. The camel will be the centerpiece for Calcomp's advertising in the caravan which starts in Boston Feb. 22.

Japan Seen Lagging Behind U.S.

TOKYO — Domestic producers of computers in Japan have not been able to match the "immense outlays for research and development" made by their U.S. competitors and therefore they face an uphill struggle to develop the know-how necessary for survival.

That's the major conclusion in an analysis of the Japanese computer industry in the current issue of *Japan Banking Briefs*, a monthly bulletin of The Fuji Bank, Ltd., one of Japan's leading commercial banks.

Recently, the bank pointed out, the domestic computer industry in Japan underwent a series of affiliations which resulted in the formation of three groups of producers.

But, the association of companies still may not give the industry the strength necessary to hold its own worldwide, Fuji notes.

As a result of the reorganization, Fujitsu and Hitachi, the two largest indigenous makers, have agreed to cooperate in the design and development of new models.

Hitachi had been affiliated with RCA. Mitsubishi Electric, Oki Electric, Oki Drive and Nippon Univac also have agreed to produce compatible equipment under existing ties with Univac, the bank noted.

The third union involves Toshiba and Nippon Electric. The two are expected to consolidate their computer division, the bank said.

Spurring these moves has been the Japanese Government's Ministry of International Trade and Industry (MITI), which, last spring, moved to liberalize the computer industry generally.

Increasingly, domestic producers will face the unassisted competition of foreign makers. Already IBM, which has a world market share of about 70% of the computer business, as compared with 2.2% for all Japanese makers, produces 30% to 40% of computers made here.

The organization, resulting from the tie-up of Fujitsu and Hitachi, will have 30% of the domestic computer market, and will have at least some competitive clout against the stronger U.S. organization, the bank said.

RCA Shows Military Computers, Future Directions

By Frank Piasta
or the CW Staff
BURLINGTON, Mass. — RCA may have indicated one of the directions it will take at a press conference here to demonstrate its newest computer for aerospace communications control. The meeting, which also announced a second communications processor, was the first major press conference for the company since it announced its withdrawal from the general-purpose computer business in September 1971. At that time,

RCA said it would continue to develop communications networks and specially designed business systems.

Software Compatible

Although both the demonstrated Model 195 and the R-100, which was announced, are built with military and aerospace applications in mind, the units include features, such as complete software compatibility with the RCA Spectra series, that would interest the commercial user.

Key personnel of the company's Government and Commercial Systems Division said plans to enter the business area were incomplete, but indicated turnkey communications systems for retail stores, airlines, hotels and automobile rental agencies were being considered.

In addition to the processors, the company outlined the development of a new line of programmable terminals and a proprietary method of displaying high-resolution alphanumeric characters on a CRT by its Van Nuys, Calif., facility, which also produces high-capacity drum memories.

The 195 computer is very similar to the RCA Spectra series since it is capable of decimal and parallel binary operations. Main memory, with a cycle time of 1.5 μ sec/32-bit word, can contain up to eight 16K or 32K word modules.

The design includes a scratch pad memory with a capacity of 12K 36-bit words in the CPU and each I/O unit, and a 1K 64-bit word ROM. Cycle time for either memory is 300 nsec/word.

The full set of Spectra peripherals, including disk pack drives, magnetic tape units and card printing equipment, can be attached to the 195.

Another military computer, the 215, is a dual-processor configuration of the 195 with "fail-soft" characteristics.

Communications

The R-100 Communications

Processor is a real-time communications data processor that is also Spectra and 360 compatible. It features a wired-in-loop capability to interface with transmission lines for real-time data access and offers stored program control for transmission procedures and data processing. It includes a special instruction set for communications data processing, fast interrupt response capability to accommodate real-time data handling and a multiple set of scratch pads to minimize overhead loss.

Main memory, with a 1 μ sec cycle time, is available in sizes from 16K to 256K bytes, and can be optionally expanded to 16M bytes. A 240 msec ROM is fitted in sizes from 512 to 1K 80-bit words.

RCA also said it is at work on the next generation C/MOS computer, specifically one whose CPU will be one-tenth the size and require one-tenth the power of current computers. The C/MOS computers will make maximum use of LSI technology, RCA said.

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Proprietary Software—Part III

How to Compete Against Unbundled, Bundled Firms

By Martin A. Goetz

Special to Computerworld

Software competition from computer manufacturers can be divided into two major categories: the unbundled and the bundled companies.

It is still too early to ascertain the full effect of unbundling upon current clients of independent software and service companies. One thing, however, is certain: the very act of unbundling has substantiated the claims of many software concerns that software is a tangible item that can and should be separately priced.

For software houses, IBM's 1969 unbundling announcement was like a breath of fresh air. It meant that users eventually would be able to compare, evaluate, and freely choose among software products, systems analysis proposals or education services. Without doubt, this was an historic moment for the entire computer industry.

Ten years hence, it may be difficult to imagine how it could ever have been any other way. Unfortunately, the era of "free" software is not yet past and some difficult times still lie ahead.

'Unbundled' Competition

A software company competing against IBM 360/370 software, the unbundled category, probably will be faced with one of the following situations.

- The proprietary product is competing against IBM's "program products," e.g., IMS, Code and Go Fortran, brokerage accounting package, etc.

- The product is competing against a previously free package that has been enhanced, and for which there is now a "fee" monthly charge; e.g., ANS Cobol, enhanced IBM 483 Sort (SM-1), etc. Although these programs theoretically fall under the "program products" category, the actual prices do not seem to reflect true development costs.

- The product is competing against IBM's still free "System Control Programs," e.g., TSO, CRJE, OS, DOS, etc.

- The product is competing against an IBM program announced or available prior to June 30, 1969; e.g., Cobol D, E, or F compilers, IBM Sorts 450 or 483; PL/I, Fortran, or Assembly compilers, RPG5, etc.

- The product is competing against IBM's Type 3 "free" packages (one which is donated by an IBM user or division, e.g., Power).

Most IBM "program products" appear to be fairly priced, resulting in fair competition with proprietary software products. Regrettably, however, most of the software packages in use today are not program products. IBM has recently begun to develop and replace a substantial amount of existing software.

At present, most independent software companies are concentrating only on those "special application" software packages included under IBM's new program product pricing plan. Those software companies

which are currently writing software packages that will inevitably compete with IBM's "still free" software probably will not survive unless IBM separately prices all of its software packages. This possibility, however, seems rather remote, since IBM has publicly stated that some of its software will always be "free."

The now famous IBM announcement to unbundle seems to contain an inherent contradiction. IBM has admitted that soft-

ware can be separately priced, but it simultaneously stated that "system control programming" will continue to be provided without charge.

IBM's sole justification for this exception is that such programs are "fundamental to the operation and maintenance of a system." This argument loses some of its strength when viewed in the context of IBM's hardware pricing policy.

For example, on the 360/65,

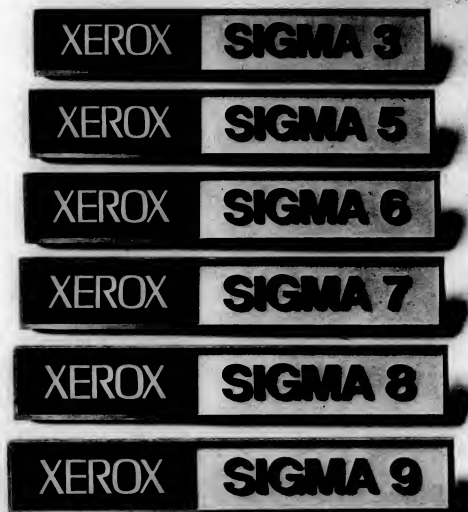
IBM allows a buyer to choose among various memories, each with its own selling price. It certainly cannot be denied that a memory unit is also "fundamental to the operation" of a computer; yet, IBM is willing to subject this integral hardware component to separate pricing.

Development Limited

As a result of IBM's continuing a "free" software policy, certain improved software products can-

not be developed by software manufacturers. Consequently, IBM users must face living with a large number of IBM software packages for the foreseeable future.

Most software companies could produce a new Cobol compiler, or a Fortran compiler, or a new Isam package today, but they will not, simply because these products are still being given away "free," despite the promise (Continued on Page 29)



We make a full range of standard computers.

XEROX® is a trademark of XEROX CORPORATION.

Cincinnati Milacron Mini Uses Microprogramming

LEBANON, Ohio—The Process Controls Division of Cincinnati Milacron has introduced its CIP/2200 general-purpose minicomputer for business data processing as well as other mini applications.

The 2200 differs from its predecessor, the 2100, primarily in having a more sophisticated instruction set that is more easily used in such applications as list, word and data processing.

The mini incorporates microprogramming to reinforce its instruction set as well as to control

such hardware features as the serial I/O controller, bootstrap loader and high-speed direct memory channel block I/O.

Decimal arithmetic can be handled by having decimal num-

bers appear as byte strings in memory, up to 16 digits in length. Decimal numbers may be

manipulated as input, eliminating packing and code conversion.

Software includes an RPG compiler, on-line debugging system, assembler, linking loader and library facilities.

The CIP/2200 sells for \$4,000 in quantities of 10, including 4K core memory and software. Delivery is 90 days.

Lower Prices for New CSS-3
BURLINGTON, Mass.—Computer Signal Processors, Inc. has introduced two new models of its CSS-3 Digital Signal Process-

ing Systems. Prices start at \$25,900, almost half that of the earlier model.

The improved systems have over 50 preprogrammed functions which can be combined to generate other functions using automatic procedure storage and execution techniques. Other new features include dual channel sample and hold, greater sampling interval resolutions and arithmetic as well as signal processing capabilities, according to the company at 209 Middlesex Turnpike, 01803.

Other New Products

An MOS controller, used with the Redatron Corp., Happonage, N.Y., magnetic card reader, handles hundreds of dollars worth of electronics and provides greater reliability, according to the company.

Available at low cost in \$12 to 16K 8 to 40 bit word sizes, the MBM single card memory from Compumatic Systems Corp., Woodland Hills, Calif., operates at 1 μ sec cycle time.

New OEM Products

How to Compete In Software Area

(Continued from Page 28)

of unbundling.

In addition, IBM Type 3 packages (those donated by IBM customers or divisions) are also still available at no cost to further stifle the development of a wide range of competitive packages.

In the end, IBM continues to control the software market. It has secured its position for the next several years by refusing to separate *all* existing software. Its strategy seems to be to keep enhanced software package prices low, force out competitors, then raise the package prices and make the users pay.

Even the current IBM 370 price reduction, although nominal from the user's standpoint, has given IBM undue flexibility in software pricing.

This strategy is certainly good for IBM, but it hardly eases the bill ultimately paid by software users.

It should be adequately clear that many circumstances still make it impractical, if not impossible, for a software house to compete with one of the so-called "unbundled companies."

"Bundled" Competition

Competing against bundled companies is an even more risky undertaking for independent software manufacturers. Surprisingly, however, the bundled computer manufacturer may eventually fare worse than the independent software company because:

- The availability of high-quality software is a key consideration when evaluating computer hardware purchases. A bundled company may actually lose hardware sales because of the poor quality of its bundled software.

- Independent software companies are reluctant to invest in development of software packages that may face competition from a manufacturer's "free" software. Since most proprietary software investments will be directed toward "unbundled" hardware, a computer user will have a significantly greater choice of software from an "unbundled" manufacturer.

Given the above factors, it is highly probable that the hardware manufacturers who will survive through the 1970s will be those companies that have unbundled their hardware and software costs.

Goetz is vice-president at Applied Data Research Inc.

XEROX

SIGMA 6.14

But problems don't come in standard sizes.

Chances are, most of your information processing problems can be handled by standard computers, using standard software.

But, traditionally, there are always a few applications that get swept under the proverbial rug. At least until they become critical enough to warrant a good deal of pressure to get them solved.

We want you to consider an unorthodox alternative: let us solve the whole range of problems, right from the start.

We'll begin with our standard line: six Sigma mainframes; a full line of peripherals; five software systems; a dozen languages; hundreds of special purpose programs.

But instead of trying to sell you on the standard package

only, we'll mutually consider your requirements from a systems point of view. Then we'll modify, redesign, rewrite, reconfigure, reform and revise, until our system fits into your particular way of doing business.

That's our particular way of doing business.

WE GIVE YOU A BETTER FIT.
Xerox Data Systems

XEROX.

Data Products' Plan Proceeds

WOODLAND HILLS, Calif. — Data Products Corp.'s "planned turnaround program . . . is proceeding close to schedule," according to President Graham Tyson, who noted revenues in the nine months ended Dec. 25 rose 22% over the year ago period.

Revenues reached \$38.5 million, a new high for any nine-month period, and earnings rose to \$488,000, or 7 cents a share, compared with a loss of \$8.9 million, or \$1.39 a share a year ago. All elements of Data Products' business are improved, he stated.

The peripherals firm recorded its third consecutive quarter of profit growth in fiscal 1971. "It is significant that, during a period of consolidation, we have been able to increase revenues more than 22%. Additionally, backlog has shown a steady growth throughout the year, and is now at \$37.3 million, more than 16% over that of one year ago," Tyson explained.

Univac has agreed to purchase Data Products' System 7114 large disk store and patents and manufacturing rights of the unit. The contract is valued at about \$3.5 million. "We believe that long-term benefits to Data Products will be greater as a result of this transaction, due to having the resources of Univac solidly behind the disk file program," Tyson added.

DPA Incurs \$10.5 Million Loss in 1971

DALLAS — Although in October DPA Inc. was "anticipating a record year in sales, earnings and earnings per share," the diversified leasing firm announced a \$10.5 million loss for the year ended Nov. 30.

The reason? A decision to take a whopping \$16.1 million depreciation charge on data processing equipment held for lease during the year, plus a one-time charge of \$6.9 million, net of \$5 million tax benefits, primarily for additional depreciation. In 1970, DPA's depreciation charges totaled \$4.6 million, according to the company.

But if DPA had used the same depreciation rate and method as in 1970, earnings would have been \$2.2 million, or 40 cents a share, up 57% from \$1.4 million

or 58 cents a share. Sales in 1971 were a record \$34.6 million, up 13% from 1970's \$30.6 million.

As a result of the depreciation acceleration and the "one-time" charge, the carrying value of the DP equipment has been reduced to an amount in line with what the company anticipates can be recovered from future leasing

operation, the company said.

"Operating profits before depreciation were at record levels in 1971," said President John B. Tullihill. "Because the depreciation charges as finally determined were larger than had been anticipated, we now believe DPA will be profitable in 1972, if current levels of operations continue."

DEC Six-Month Earnings Rise 21.9%

MAYNARD, Mass. — Digital Equipment Corp.'s (DEC) earnings rose 21.9% to \$6.6 million in the six months ended Jan. 1 compared with \$5.4 million in the same period last year.

Revenues scored a comparable gain, up 21.6% to \$83.3 million from \$68.5 million in the same six months of 1970.

Per share earnings for the 1971 period were 64 cents, including a non-recurring gain equal to about 3 cents a share from foreign currency translation. In the six months of 1970, earnings were 55 cents a share.

In the quarter, earnings totaled \$3.6 million or 35 cents a share, up from \$2.5 million or 25 cents a share in the comparable 1970 period. Revenues climbed to \$44.9 million from \$34.5 million in the year ago quarter.

"Shipments in our small computer lines have been very strong recently. Mini-computers have continued to grow even during last year's slowdown in the capital equipment market," noted President Kenneth H. Olsen.

DEC has increased production of its PDP-11 line by 40%, and anticipates a rise in sales of the PDP-8 and PDP-11 in 1972, he said.

Duo 360/370 breaks the DOS to OS bottleneck.

Meet the wizard of OS.

It's an exclusive software method of ours that permits you to run most DOS programs under OS with no conversion of the object program.

And the savings are shattering.

Your man-hours required for conversion may be cut by 50 to 90 per cent. Your OS test time is dramatically reduced.

And, while you're into 100 per cent OS operation much sooner, you're free to re-program at your own rate of speed without bottling-up people, machines or extra money.

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 title _____
 company _____
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 city/state _____ zip _____

UCC

UNIVERSITY COMPUTING COMPANY
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 Dallas, Texas 75247



Nickels & Dimes

IBM has declared a quarterly dividend on common stock of \$1.35 per share to shareholders of record Feb. 9 payable March 10. The previous quarterly dividend was \$1.30.

Computer Optical Systems stockholders voted to issue 50,000 additional shares of common stock.

Stock split department: Computer Servienters Inc. stockholders approved a one for five reverse stock split, and Centronics Data Computer declared a three for one stock split to stockholders of record Jan. 28.

Scan-Data raised about \$350,000 from a sale of common stock to three private investors. Funds will be used to help support an increased production schedule.

And two firms have joined the "first profitable" club. Datacraft has recorded its first profitable six-month period. In the half-year ended Dec. 10, revenues reached \$3.3 million, an increase of 55% over the \$2.1 million reported in the same 1970 period. Earnings rose to \$131,237 or 10 cents per share compared with a loss of \$337,838 or 18 cents a share.

And Com-Share Inc. is celebrating its first profitable quarter. In the three months ended Dec. 31, earnings were \$69,227 or 7 cents per share compared with a loss of \$213,587 or 26 cents per share in the same period a year ago. Revenues reached \$1.9 million, up from \$1.3 million in the same 1970 quarter.

Infotek's plan for settlement with its creditors under Chapter XI has been approved by the U.S. District Court, Eastern District in Westbury, N. Y.

TRADE QUOTES

Computerworld
Stock Trading Summary

CLOSING STOCKS THURSDAY, FEBRUARY 3, 1972

| | 71-72 | PRICE | WEEK | PERCENT | NET | PERCENT |
|--|-------|-------|------|---------|-----|---------|
| | | RANGE | CHG | CHG | | CHG |
| | (1) | (1) | (1) | (1) | (1) | (1) |

SOFTWARE & EDP SERVICES

| | | | | | | |
|-----------------------|-------|--------|--------|-------|--|--|
| O ADVANCED COMP TECH | 1-4 | 1 1/4 | +1/8 | +11.1 | | |
| A APPLIED DATA RES. | 1-3 | 2 1/4 | +1/4 | +12.5 | | |
| O APPLIED LOGIC | 1-3 | 2 1/4 | +1/4 | +12.5 | | |
| N AUTOMATIC DATA PROC | 44-85 | 28 1/2 | +3 | +5.6 | | |
| O AUTO SCIENCES | 1-8 | 5/8 | 0 | 0.0 | | |
| O COMPUTER NETWORK | 2-11 | 6 | -1 1/4 | -17.3 | | |

| | | | | | | |
|---------------------------|-------|--------|------|-------|--|--|
| N COMPUTER SERVICES | 6-17 | 9 1/4 | +1/2 | +5.3 | | |
| O COMPUTER TECHNOLOGY | 4-11 | 6 7/8 | +1/4 | +5.7 | | |
| O COMPUTER USAGE | 5-16 | 10 1/8 | +1/4 | +2.5 | | |
| O COMP. AUTOMATIC REPORTS | 6-13 | 9 1/4 | -1/4 | -11.4 | | |
| N COMPUTING & SOFTWARE | 17-45 | 25 1/2 | -1/4 | -0.9 | | |

| | | | | | | |
|----------------------|------|-------|------|-------|--|--|
| O COMRESS | 1-4 | 1 7/8 | +1/4 | +12.7 | | |
| O CONSUMER | 4-8 | 7 | +7/8 | +13.2 | | |
| O DATA AUTOMATION | 1-4 | 5/8 | +1/8 | +16.6 | | |
| O DATA PACKAGING | 6-10 | 6 1/2 | +1/4 | +5.0 | | |
| O DATAMATION SERVICE | 1-3 | 7/8 | +1/8 | +10.6 | | |
| L DATAPAT | 4-10 | 5 1/4 | +1/4 | +10.6 | | |

| | | | | | | |
|------------------------|-------|--------|------|-------|--|--|
| O EDP RESOURCES | 5-16 | 6 5/8 | +1/2 | +8.6 | | |
| N ELECTRONIC DATA SYS. | 34-85 | 10 1/8 | +1/2 | +15.1 | | |
| O INFORMATICS | 6-15 | 10 1/4 | +1/4 | +3.5 | | |
| O I.O.A. DATA CORP | 1-3 | 1 | +1/4 | +11.1 | | |
| A ITEL | 1-8 | 1 1/4 | +1/4 | +11.1 | | |

| | | | | | | |
|-----------------------|------|-------|------|-------|--|--|
| N KEANE ASSOCIATES | 4-14 | 8 1/2 | 0 | 0.0 | | |
| O KEYDATA CORP | 5-14 | 8 1/8 | +1/8 | +1.5 | | |
| A MANAGEMENT DATA | 5-11 | 5 7/8 | +5/8 | +8.1 | | |
| O NATIONAL CSS INC | 1-4 | 17 | 0 | 0.0 | | |
| O NAT. COMP. ANALYSTS | 1-4 | 3 | +1/4 | +15.3 | | |
| P ON LINE SYSTEMS INC | 1-8 | 1 1/4 | +1/4 | +11.1 | | |

| | | | | | | |
|------------------------|-------|--------|------|-------|--|--|
| N PLANNING RESEARCH | 10-16 | 16 3/8 | -3/8 | -2.7 | | |
| O PROGRAMMING & MTHS | 16-29 | 22 3/4 | +1/4 | +1.0 | | |
| O SCIENTIFIC COMPUTERS | 2-4 | 4 1/2 | +1/2 | +14.3 | | |
| O SIMPLICITY COMPUTER | 4-14 | 2 5/8 | -1/8 | -6.5 | | |
| O SOFTWARE SYSTEMS | 1-4 | 1 1/4 | +1/4 | +11.1 | | |

| | | | | | | |
|------------------------|-------|--------|--------|-------|--|--|
| O TBS COMPUTER CENTERS | 4-9 | 9 1/2 | 0 | 0.0 | | |
| O TOLLEY INTL CORP | 8-8 | 7 3/8 | +3/8 | +5.3 | | |
| O TRACOR COMPUTER | 1-4 | 1 1/4 | +1/4 | +11.1 | | |
| O TYMSHAW INC | 4-15 | 8 3/4 | +1 1/2 | +20.0 | | |
| O UNITED DATA CENTER | 1-4 | 10 1/4 | +1/4 | +3.5 | | |
| UNIVERSITY COMPUTING | 14-28 | 21 | -1 1/2 | -6.8 | | |

| | | | | | | |
|---------------|------|-------|------|-------|--|--|
| A URS SYSTEMS | 5-11 | 6 7/8 | -1/2 | -6.7 | | |
| O VORTEX CORP | 2-6 | 5 1/4 | +1/2 | +10.5 | | |

PERIPHERALS & SUBSYSTEMS

| | | | | | | |
|-----------------------|-------|--------|------|-------|--|--|
| N ADDRESSOGRAPH-MULT | 24-48 | 38 1/8 | +1/8 | +0.3 | | |
| L ALPHAMERIC | 1-4 | 1 1/4 | +1/4 | +11.1 | | |
| N AMPEX CORP | 10-15 | 10 3/4 | -1/2 | -4.4 | | |
| N ANDERSON JACOBSON | 1-4 | 10 1/4 | +1/4 | +3.5 | | |
| O ATLANTIC TECHNOLOGY | 3-8 | 7 1/2 | +1/4 | +6.0 | | |
| A BOLT, BERANEK & NEW | 1-4 | 3 | +3/8 | +12.5 | | |

| | | | | | | |
|------------------------|-------|--------|------|-------|--|--|
| N BURROUGHS | 6-17 | 10 1/4 | +3/8 | +3.7 | | |
| CalCOMP | 14-33 | 23 1/2 | 0 | 0.0 | | |
| O COUNTRONICS | 2-9 | 5 | +1/2 | +16.6 | | |
| O COLORADO INSTRUMENTS | 1-4 | 1 1/2 | +1/4 | +11.1 | | |
| O COMPUTER COMMUN. | 5-19 | 6 3/4 | +7/8 | +11.8 | | |
| COMPUTER EQUIPMENT | 1-4 | 1 1/4 | +1/4 | +11.1 | | |

| | | | | | | |
|-------------------------|------|--------|------|-------|--|--|
| A COMPUTEST | 4-20 | 8 3/8 | -1/8 | -1.4 | | |
| O CONSOL. COMPUTER LTO. | 1-12 | 5 1/4 | +1/8 | +2.0 | | |
| O DATA PRODUCTS CORP | 7-10 | 13 3/8 | +1/4 | +3.0 | | |
| O DATA RECOGNITION | 3-8 | 4 1/4 | 0 | 0.0 | | |
| O DATA TECHNOLOGY | 3-9 | 1 7/8 | +1/4 | +8.6 | | |
| O ELECTRONICS | 1-4 | 1 1/4 | +1/4 | +11.1 | | |

| | | | | | | |
|------------------------|--------|--------|------|-------|--|--|
| N ELECTRONIC M & M | 5-16 | 7 3/8 | -5/8 | -7.8 | | |
| O FARRI-TEK | 6-14 | 1 1/8 | +1/4 | +11.1 | | |
| O GENERAL COMPUTER SYS | 6-14 | 1 1/8 | +1/4 | +11.1 | | |
| N GENERAL ELECTRIC | 55-124 | 61 1/2 | -7/8 | -1.4 | | |
| O INFORCE INC | 17-18 | 4 1/2 | +1/2 | +12.5 | | |
| O INFORMATION DISPLAYS | 3-8 | 4 | +1/4 | +5.8 | | |

| | | | | | | |
|-----------------------|-------|--------|------|------|--|--|
| O MANAGEMENT ASSIST | 1-2 | 7/8 | 0 | 0.0 | | |
| A MARSHALL INDUSTRIES | 7-27 | 11 1/2 | -3/8 | -3.1 | | |
| N MEMORE | 20-78 | 36 5/8 | +1/4 | +0.6 | | |
| A MILO ELECTRONICS | 12-26 | 24 1/2 | +3/8 | +1.5 | | |
| A MONMOUTH DATA SCI | 15-17 | 22 1/4 | +1/2 | +2.0 | | |
| O OPTICAL SCANNING | 6-18 | 8 1/2 | +3/8 | +3.9 | | |

| | | | | | | |
|----------------------|-------|--------|--------|-------|--|--|
| O PHOTON | 8-12 | 11 1/4 | +2 1/4 | +25.0 | | |
| A POTTER INSTRUMENT | 13-19 | 19 1/4 | +1/4 | +0.5 | | |
| O PRECISION INST. | 7-10 | 13 3/8 | +1/4 | +3.0 | | |
| O RECOGNITION EQUIP | 9-26 | 13 1/8 | -1 1/4 | -8.6 | | |
| O RECORD CORP. | 1-8 | 3 1/8 | -1/8 | -2.3 | | |
| N SANDERS ASSOCIATES | 1-2 | 14 5/8 | +3/8 | +2.0 | | |

| | | | | | | |
|---------------|------|--------|--------|------|--|--|
| O SCAN DATA | 8-15 | 11 5/8 | +1/4 | +1.1 | | |
| O TALLY CORP. | 6-17 | 12 1/2 | +1/4 | +1.0 | | |
| O TELYX | 6-22 | 13 1/2 | -1 1/4 | -7.6 | | |

SUPPLIES & ACCESSORIES

| | | | | | | |
|-----------------------|-------|--------|------|-------|--|--|
| N ADAMS-WILLIS CORP | 9-19 | 12 1/4 | +1/2 | +4.2 | | |
| O BALTIMORE BUS FORMS | 6-10 | 7 1/4 | 0 | 0.0 | | |
| A BARRY INDUSTRY | 1-4 | 1 1/4 | +1/4 | +11.1 | | |
| O DATA DOCUMENTS | 14-29 | 22 | 0 | 0.0 | | |
| A DUPLEX PRODUCTS INC | 8-13 | 5/8 | +1/4 | +12.5 | | |
| N ENNIS BUS. FORMS | 5-13 | 8 | +1/4 | +3.2 | | |

| | | | | | | |
|--------------------|-------|---------|--------|------|--|--|
| O GRAHAM MAGNETICS | 9-35 | 21 1/4 | +1 7/8 | +9.6 | | |
| O GRAPHIC CONTROLS | 6-15 | 12 3/4 | +1/4 | +2.0 | | |
| IN COMPANY | 9-19 | 118 3/4 | +1/4 | +0.3 | | |
| O HOBBS & FORDS | 28-87 | 65 3/4 | +1 | +1.2 | | |

| | 71-72 | PRICE | WEEK | PERCENT | NET | PERCENT |
|--|-------|-------|------|---------|-----|---------|
| | | RANGE | CHG | CHG | | CHG |
| | (1) | (1) | (1) | (1) | (1) | (1) |

| | | | | | | |
|----------------------|-------|--------|--------|------|--|--|
| N NASHUA CORP | 29-53 | 53 1/4 | +1 1/4 | +2.1 | | |
| O REYNOLDS & REYNOLD | 37-72 | 71 | +1 1/4 | +3.2 | | |
| O STANDARD REGISTER | 14-23 | 23 5/8 | -1/2 | -2.7 | | |
| O TAB PRODUCTS CO | 8-17 | 16 3/4 | +3/4 | +4.5 | | |
| N UNICARD | 23-34 | 26 1/2 | +1/4 | +0.6 | | |
| A WASHAM MAGNETICS | 5-10 | 8 5/8 | -1/4 | -1.4 | | |
| N WALLACE BUS FORMS | 18-26 | 24 5/8 | +1/4 | +1.0 | | |

COMPUTER SYSTEMS

| | | | | | | |
|-------------------------|---------|---------|--------|-------|--|--|
| N BURROUGHS CORP | 105-160 | 155 1/2 | +1/4 | +0.6 | | |
| N COLLINS RADIO | 10-20 | 17 5/8 | +1 | +6.0 | | |
| N CONTROL DATA CORP | 34-85 | 55 1/2 | +1/4 | +0.4 | | |
| O DATA GENERAL CORP | 19-47 | 67 | +5 3/4 | +8.3 | | |
| O DIGITAL CORP. CONTROL | 4-24 | 24 | +1/2 | +10.3 | | |
| N DIGITAL EQUIPMENT | 53-92 | 91 3/4 | +7 5/8 | +9.2 | | |

| | | | | | | |
|-----------------------|--------|---------|--------|-------|--|--|
| N ELECTRONIC ASSOC. | 5-9 | 7 3/8 | -1/8 | -1.1 | | |
| A ELECTRONIC ENGINEER | 5-11 | 11 3/4 | +1 3/4 | +13.8 | | |
| N FOXBORO | 25-46 | 37 1/2 | +1 3/4 | +4.8 | | |
| O GENERAL AUTOMATION | 9-26 | 21 | +1/4 | +1.5 | | |
| N HEWLETT-PACKARD CO | 30-51 | 50 7/8 | +2 1/4 | +4.8 | | |
| N HONEYWELL INC | 83-147 | 147 1/4 | +4 5/8 | +3.0 | | |

| | | | | | | |
|-----------------|---------|---------|--------|-------|--|--|
| N IBM | 284-374 | 374 1/4 | +5 | +1.3 | | |
| O INTERDATA INC | 25-49 | 33 | +1 7/8 | +21.7 | | |
| N NCR | 18-21 | 21 | +1 1/8 | +3.2 | | |
| N RAYTHEON CORP | 27-46 | 46 1/4 | +3 1/4 | +7.7 | | |
| N SPERRY RAND | 23-38 | 36 3/4 | +3/4 | +1.8 | | |

| | | | | | | |
|------------------------|--------|---------|--------|------|--|--|
| A SYSTECH PHO. LABS | 7-18 | 12 3/4 | -1/2 | -1.7 | | |
| N VARIAN ASSOCIATES | 11-16 | 15 3/8 | -7/8 | -5.1 | | |
| N VICTOR CH. PROPIETOR | 12-27 | 10 3/4 | -1 1/4 | -6.9 | | |
| N WAC. LABS. | 28-50 | 37 1/2 | +1/4 | +0.6 | | |
| N XEROX CORP | 85-129 | 121 1/4 | +5/8 | +0.2 | | |

LEASING COMPANIES

| | | | | | | |
|-------------------------|-------|--------|--------|-------|--|--|
| A BOOTHE COMPUTER | 11-27 | 16 7/8 | +1 | +6.2 | | |
| O BRESNAHAN CORP. | 2-4 | 4 | +3/4 | +18.8 | | |
| O COMPUTER EXCHANGE | 1-9 | 2 1/8 | +1/4 | +14.3 | | |
| O COMPUTER INVESTS. GRP | 7-14 | 10 | -1/8 | -1.2 | | |
| N DPF INC | 8-19 | 11 1/2 | -1 3/8 | -10.6 | | |
| O OSTROICH RENTAL | 2-4 | 3 7/8 | +1 1/2 | +39.1 | | |

| | | | | | | |
|----------------------|-------|--------|--------|------|--|--|
| A PCL INC | 5-13 | 5 1/8 | +1/4 | +4.8 | | |
| O OGDENSHAW-STORM | 13-23 | 20 1/2 | +1 3/8 | +7.1 | | |
| A PPA, INC. | 4-9 | 9 3/8 | 0 | 0.0 | | |
| O RASBITE INT. | 7-13 | 7 3/4 | -3/8 | -3.7 | | |
| A GREYHOUND COMPUTER | 7-11 | 10 1/8 | -3/8 | -3.5 | | |
| N LEASCO CORP | 4-10 | 10 1/4 | +1/4 | +3.0 | | |

| | | | | | | |
|---------------------|-------|--------|--------|-------|--|--|
| U LOGIC NET INC | 2-5 | 5 1/2 | +1/8 | +3.7 | | |
| O NCC INDUSTRIES | 3-10 | 9 1/2 | +1 1/8 | +13.4 | | |
| A ROCKWOOD COMPUTER | 3-9 | 4 7/8 | +1/4 | +5.4 | | |
| O SYSTEMS CAPITAL | 5-7 | 4 | +3/8 | +10.5 | | |
| N U.S. LEASING | 16-43 | 42 1/4 | +3 3/4 | +9.7 | | |

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|---|--|--|--|--|--|--|
| EXCH. "H" (VORTEX EXCHANGE) "H" (PAPERMAN EXCHANGE) | | | | | | |
| L "H" (VORTEX EXCHANGE) "H" (PAPERMAN EXCHANGE) | | | | | | |
| P "H" (VORTEX EXCHANGE) "H" (PAPERMAN EXCHANGE) | | | | | | |

| | | | | | | |
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| O-T "H" PRICES ARE 41% OFF AS OF 3 P.M. OF LAST B'D | | | | | | |
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